NATURE-NURTURE, I.Q., AND JENSENISM: A HISTORICAL PERSPECTIVE

By

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Abstract of Dissertation Presented to the Graduate Council of the University of Florida in Partial Fulfillment of the Requirement for the Degree of Doctor of Philosophy

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The historical roots of the modern nature-nurture controversy which arose as a reaction to the social implications of jensenism are examined. Educational psychologist Arthur Jensen is mainly responsible for the recent arguments concerning the heritability of intelligence. The question is related to the broader issue of human equality.

The author takes an interdisciplinary approach to demonstrate that jensenism is not a new movement but has deep historical foundations beginning with the political philosophy of Classical Greek philosophers. The philosophical aspects of the controversy are traced from Plato to America's Declaration of Independence. At this point the scientific rationale for racist doctrine is carried forward by developments in nineteenth century anthropometry. The next section deals with the eugenics movement of the early twentieth century biometricians who separated themselves from early geneticists. The author then relates the marriage between the American eugenics movement and the young science of mental

testing. Following a description of the various major theories regarding the nature of intelligence, the works of Arthur Jensen are introduced. The focal point is a recapitulation of Jensen's controversial 1969 article, "How much can we boost I.Q. and scholastic achievement?" in the Harvard Educational Review and the reactions to that article.

In the next chapter the theoretical underpinnings of evolutionary and population genetics which render the I.Q. controversy indefinitive are presented. The final chapter is dedicated to constructing a new metaphor for educational theorists based on the more optimistic alternatives within genetic postulations. This metaphor is put forth as a source of inspiration for egalitarian ideals emerging from a sound scientific rationale.

Chairman

PROLOGUE

In the winter of 1969 an article entitled "How Much Can We Boost I.Q. and Scholastic Achievement?" appeared in the Harvard Educational Review. The author was Arthur Jensen, an educational psychologist from the University of California at Berkeley. The article was submitted by Jensen on invitation from the editorial board of the Harvard Educational Review and at 123 pages was the longest article ever published by the journal. In didactic fashion, Jensen presented a review of literature on the relative influence of environment and heredity on cognitive ability and concluded that the observed differences in intelligence tests scores among races and social classes were predominantly genetic in origin. Such an idea would probably have been absorbed without a shocking impact into the literature of an earlier period, but 1969 academia had taken such an environmentalist turn that black environmentalist Thomas Sowell classified Jensen as "easily the most controversial intellectual since such nineteenth century giants as Darwin and Marx" (Fincher, 1976, p. 231).

The real importance of Jensen's theories seems to lie in the reactions in all areas of academia to the 1969 article. Jensen's ideas have become reified to the point of representing any position which is racially nonegalitarian. Richard C. Lewontin has compared Jensen to Cornelius Jansen,

the Bishop of Ypres, who was condemned by Pope Innocent X in 1653 for espousing the doctrine of "total depravity, irresistable grace, lack of free will, predestination and limited atonement." This doctrine, "Jansenism," according to Lewontin, has become "Jensenism" (Lewontin, 1976, p. 78). Some critics of Jensen would carry the analogy further to project Jansen's attitude toward science onto the work of Arthur Jensen. Jansen cautioned men to "beware of that vain love of science, which though seemingly innocent, is actually a snare 'leading men away from the contemplation of eternal truths to rest in the satisfaction of the finite intelligence'" (Merton, 1970, p. 120).

Many criticize Jensen for removing himself from science and merely espousing racism. He is most often criticized for his loose interpretation of evidence, rather than for the evidence itself.

In examining the literature which has emerged in the ten year aftermath of Jensen's article, several categorical questions immediately arise which have remained elusively unanswered. First, how did it happen that an idea which could have been called Galtonism 100 years ago, Pearsonism 80 years ago, or Burtism 40 years ago spontaneously became jensenism today? How did Jensen come to symbolize a hereditarian attitude which has historically been the norm and is anything but new? Second, is jensenism built on a faulty foundation? Are the scientific methods brought to bear on the evidence of questionable origin? If not, were

they put to questionable use? Third, why are we so concerned to begin with? Why did Jensen draw fire from biologists, geneticists, psychologists, economists, and anthropologists, as well as educators? Are there not alternatives which, if brought to bear on educational theory, would put jensenism to rest as a threatening hypothesis demanding meticulous and tireless criticism in order to restrain its progress? It was the search for answers to these questions that instigated this work. But the finished product was a result of more far reaching problems uncovered by this search. In light of current problems, both theoretical and practical, the nature-nurture argument cuts much deeper into the foundations of our society than superficial research reveals. As you read this work it should become apparent that it is not a refutation of confrontation with an educational psychologist named Arthur Jensen, nor is it designed to champion his opposition. Rather, it is my intention to show that the zeitgeist at any given time in history has clouded the more important issue of human equality; and a democratic educational system must be ever sensitive to this original purpose.

Racialism and inegalitarianism has always been a powerful undertow dragging opposing theories into the depths of scientific metaphor and philosophical rhetoric. It began even before philosophy and science could be viewed as separate pursuits and continues now that a scholar must narrowly define the limits of his scientific or philosophical specialization. In our social structure inequality has

become fundamental and insidious, too often ignored, too little questioned, more often than not attacked on the wrong grounds and in the case of many of Arthur Jensen's adversaries, the attack itself seems no more than an act of self-vindication--a few stones when thrown into the sea of controversy barely ripple the water and, sinking, become boring victims of the relentless undertow to be tossed about until they lie buried with other useless debris. The attempt here is to avoid a similar fate in the discussion of these issues.

As a final introductory note I must beg the reader to persistently hold in mind the following word of caution. This work, though interdisciplinary in nature, is designed to follow a few small threads of thought through a tapestry of scientific chronology; i.e. scientific support of racial and inegalitarian ideals and some of its social implications. It is therefore necessary to extrapolate material produced by some of the greatest minds in the history of man. In the following treatise, it may at times seem to the reader that either these men did nothing good for mankind or the author is purposely poisoning the reader against these intellectual giants. Neither of these is the case. It would be nearly impossible in terms of time and space to give a complete analysis of the contributions of everyone mentioned here. It was therefore necessary to restrict statements concerning each philosopher or scientist to the subject matter at hand. Most of the men and women included

herein did far more good for the advancement of science and understanding of man than any harm that may have come from some of their elitist ideals. However, contributions were made to the maintenance of an undercurrent of inegalitarian or racist beliefs that cannot be ignored; some of these contributions were more subtle or indirect than others, but they exist and it's the purpose of this work to point out these contributions rather than to slander the names of those people who have helped to make our world a little more comprehensible.

CHAPTER I
WHY BE CONCERNED?

> ...a system that presumes to tell a student what his ability is and what he can successfully learn incurs an obligation to take account of the psychological damage that can come from such an encounter between the student and the school; and to be certain that it is in a position to decide whether the student's deficiencies are true, or only apparent.
>
> Hobson vs. Hansen, Civil Action, No. 82-66, Federal Supplement, V. 269, p. 492

It has been said that the humanity of a nation is reflected in the character of its prisons and its educational system (Bowles & Gintis, 1976, p. 102). If humanitarianism can be defined in terms of the quality and equality of life produced by the institution, then, according to Jensen, the educational system in America is failing. Jensen believes failure derives from genetic bases, and that argument aside, the environmental attempts often seem contradictory in their attempts at equalizing educational opportunities. Certainly educators themselves are not opposed to an egalitarian system which gives each student it processes into the mainstream of American society the same chance at success in that society. Educators developed early intervention programs such as Head Start in an attempt to equalize entering behavior and preparedness as a move toward equal

opportunity of education. Educators also carry out the affirmative action programs in our universities in a further attempt to insure equal representation of ethnic minorities in our system. Surely such programs would not exist if there were no concern for equalizing the high quality of life which an education is supposed to assure in a prosperous, free enterprising nation.

However, educators also practice homogenous ability grouping; a means of grouping students according to similarity in scores on standardized tests, thus providing a multi-track system which separates students according to ethnic background and social class. Educators have been accused of allowing standards of admission to higher institutions of learning to reflect ethnic and social class differences so that tokenism must be the rule of thumb to assure a reasonable representation of minority groups. It appears rather paradoxical that such practices can coexist within the same institution and be simultaneously billed as proper methods for preparing children for their productive years as well as fair criteria for deciding who will produce what. How is it that this system can operate on both levels and yet be justified as achieving the same goal? Bowles and Gintis express it as the contradictory mechanism of the ideology of equal educational opportunity and the meritocracy (Bowles and Gintis, 1976, p. 103). Much of the driving force for this mechanism has been both the faith in and misunderstanding of I.Q. scores. The educational system has evolved

into what Evelyn Sharp calls the "cult of I.Q." in terms of the power assumed by the scores and their influence on the quality of education for individuals. Jack Fincher has said that "...as nearly as anything in American education, in American life, in fact, the I.Q. test was beyond secular question" (Fincher, 1976, p. 16). I.Q. scores have been such an esoteric tool of the educational system that students were not allowed to know their scores until the Buckley Act made into law the proposition that all files must be open to students and their parents.

An I.Q. score seems to have become the definition of intelligence. This in itself could be a great convenience. Unfortunately for some groups of people, I.Q. scores are a barrier to the upward mobility which is supposedly attainable in a capitalistic democracy. Black people, as a group, score lower than white people, and poor people generally score lower than rich people. This fact has puzzled many theorists, confused many policy makers, satisfied many elitists and enraged many civil rights workers throughout the history of mental testing. Still the core question, "Why is this so?" has remained a perplexing spectre beyond the theoretical grasp of social scientists. Yet, at many points in history, the answer has seemed candidly obvious to the thinkers of the day. A predominant viewpoint would be settled upon and policies would be made, only to have the policies fail, resulting in a round of polemics and another obvious answer to the question. Still the question remains:

is the intellectual state of a given group of people the result of genetic endowment, environmental conditions, or some elusive combination of the two?

By itself, the nature-nurture question is harmless and could be left to the meditations and researches of a few interested parties. Unfortunately it has always been intertwined with public policy and has profusely affected, sometimes disastrously, the quality of life of large segments of the American population. We are once again at a potential historical turning point in our attitudes toward and our willingness to work for equality of opportunity.

Just as many of his predecessors have done, Arthur Jensen has provided us with the scientific rationale for abandoning attempts to equalize our educational system across racial and social class lines. Of course, this also means that our entire social structure will remain divided along caste lines. Before jensenism takes a foothold in our policy decisions, it should be closely examined in light of some historical lessons. Jensenism is not a new concept, but it can be no less damaging unless we view it in reference to what philosophers call the "specious present " (Sherman, 1976, p. 67), the telescoping of successive events into a single time frame. We must first look at jensenism in its place in a series of successive events and decide whether he answers the nature-nurture question any better than it has been answered before, or if indeed it can be answered at all. It is the contention of the author that Jensen has been thrust

into the position of a long line of racial protagonists and that, given the present state of scientific knowledge, we cannot solve the riddle of nature-nurture, and I.Q. To let jensenism effect the zeitgeist concerning equality would be supreme irony in light of our past follies.

Our educational system cannot have an equalizing effect on society as long as I.Q. is accepted as the operational definition of innate intelligence because present tests will continue separating students into racial and socioeconomic castes. Our attitude toward mental testing is often seen as atavistic. Presently it is being increasingly criticized, and many professionals believe I.Q. testing is one of the remaining practices which has historically prevented our educational system from having an equalizing effect on society.

Alternatives to mental testing and its relationship to education are beyond the scope of this work. However, here the history of the nature-nurture controversy will be presented from its birth in philosophy, through its evolution in anthropology and biology, creating demands for harder science, its branching into eugenics vs. genetics in the early twentieth century, and its place in the history of psychometric testing. At this point Arthur Jensen's position will be presented via an overview of his 1969 article, followed by an examination of the present state of the controversy through cross disciplinary reactions to Jensen's article. In a final chapter I would like to take

the prosaic liberty of presenting some observations which have developed from two years of researching this project.

Although the material presented in this work is designed as an overview of the area for educational theorists, the problems arising in education from the nature-nurture controversy cannot be extricated from its other socio-political and psychological consequences. The genocide attempts of Adolf Hitler and Idi Amin are as closely related to attitudes of genetic inferiority as are the Pygmalion effect and antibussing riots. It is for this reason that any attempt to present this topic adequately cannot be isolated to one institution or one discipline. The purpose here is not only to assimilate reactions to the work of Arthur Jensen but to examine the broader problems of inequality supported by scientific attitudes and inflamed by those who would take evidence limited to sampling data on hand and carry it to the extreme of threatening human rights. This is not a question for educators only.

An historical perspective on any topic is generally expected to be either a recreation or a reinterpretation of past events. This is intended to be an assimilation of historical material of a primary, secondary and tertiary nature plus the relevant contribution of recent pertinent data. My emphasis is descriptive rather than interpretative.

CHAPTER II
THE ORIGIN OF THE CONTROVERSY: AN HISTORICAL VIEW FROM PHILOSOPHY

> The most notorious ill-fortune must yield to the untiring courage of philosophy - as the most stuborn city to the ceaseless vigilance of an enemy.
>
> Edgar Allen Poe in "Loss of Breath."

> O impotence of mind, in body strong!
> But what is strength without a double share
> Of wisdom? vast, unwieldy, burdensome,
> Proudly secure, yet liable to fall
> By weakest subtleties; not made to rule,
> But to subserve where wisdom bears command.
>
> John Milton in "Samson Agonistes."

It can safely be said that the nature-nurture controversy has its deepest and oldest roots in political philosophy. The concern for the rights of man and the rationale for these rights which is the stuff of political philosophy has an ancient lineage in Western History, and with the exceptions made for monastic communities and theological extremes, those who have attempted to develop egalitarian ideals have had to do so in the milieu of ardently preserved hierarchical social orders and political institutions (Pole, 1978, p. 8). However, even in the most egalitarian philosophy certain groups are invariably excluded from the freedom others are to enjoy. In general this does not appear to be the result of any bias toward a particular

group, but rather the predominant idea that some humans are naturally inferior to others, and, therefore, must relinquish any control of the society to their superiors. Historically it has been the case that when this tendentious concept has been aimed at a particular group of people on the basis of some obvious physiological or ideological difference and has been activated through public policy, some of the gravest injustices in human existence have occurred. These situations in retrospect seem ironic since the philosophy upon which they have been based has often been the champion of some previously oppressed group, i.e. Marxism, the hope of the proletariat, becomes the proletarian bureaucracy.

With persistent regularity the great philosophical theories relating to social order, or man's place in relation to other men and a divine being, have stressed the role of intelligence or the intellect as a determinant of an individual's place on the social ladder. This ubiquitous criterion has today become the main focus of the nature-nurture controversy.

In his ideal state as described in The Republic Plato (427?-347 B.C.) bases his case for specialization and division of labor on what he sees as two fundamental facts of human psychology; first, that different men have different aptitudes and, secondly, that men can gain skill only by steadily applying themselves to work for which they are naturally fitted (Sabine, 1965, p. 50). To divide the rulers from the ruled, Plato recommended an elaborate system

of education in which only those of superior intellect would remain to become the "philosopher-kings" (Stevenson, 1974, p. 29). Thus, a parallelism between mental capacities and social classes arises and all the intelligence in the state becomes concentrated in the rulers (Sabine, 1965, p. 53). Plato saw the inadequacies of prior states as a reflection of the inadequacies of its educational system. He also saw a need for better breeding to improve existing strains (Sabine, 1965, p. 51).

The axiological considerations in which Plato relates form to value is a theme which has continually reappeared to obfuscate egalitarian ideals. Plato saw that ideals, goals, and criteria are ends to which "form," in the sense of definite structure, is a means (Brumbaugh & Lawrence, 1963, p. 13). By "form" Plato means the ideal structure of any general term (Stevenson, 1974, p. 24; Brumbaugh & Lawrence, 1963, p. 15). Therefore, a chair can be a chair only to the degree to which it corresponds to the ideal form of "chairness." Likewise, an individual can only be as intelligent as the degree to which he corresponds to the ideal form of intelligence as defined by the educational system. If low social class and low intelligence seem to correlate, and one is obviously of a lower social class, then the template for success as a student can hardly be matched. This concept of an ideal "type" has also found its way into modern genetics through the proponents of the classical hypothesis of genetic diversity in which the "norm" becomes a single

genotype, thus providing a genetic basis for racism since the idea of "type" can be seen to imply the "fixity" of intelligence (Lewontin, 1974, p. 26).

Plato exerted an influence over his most famous student Aristotle (384-322 B.C.) for nearly 20 years, and Aristotelean political principles, in turn, remained influential until the end of the Middle Ages. Aristotle's Politics reflects the common prejudices of educated Greeks of his day, and in his Nicomachean Ethics he displays an acceptance of inequality which is repugnant to modern sentiment (Russell, 1945, p. 184).

In Aristotle's works we again see social inequality embraced as the natural state based on the dominance of intellect. In Politics he states the following:

> For that some should rule and others be ruled is a thing, not only necessary but expedient; from the hour of their birth, some are marked out for subjection, others for rule. (Wolff, 1976, p. 359)

He further states that,

> there must be a union of natural ruler and subject, that both may be preserved. For he who can foresee with his mind is by nature intended to be lord and master, and he who can work with his body is a subject, and by nature a slave.... (Wolff, 1976, p. 355)

Furthermore, Aristotle felt that some inferior race, not Greeks, should comprise the slave population (Russell, 1945, p. 186).

Aristotle's less than subtle view of the world as naturally racist injected powerful credence into the historical flow of racism in Western philosophy. With every reassertion of Aristotelean doctrine there was a

classical basis for racism and inequality. It is not surprising that, as Joel Kovel states, historically "slavery was an axiom of Western culture, and considered the bedrock of society. Not strictly an axiom--rather, a corollary to the even more basic idea of domination" (Kovel, 1970, p. 15).

The philosophies of Plato and Aristotle fit well into the Great Chain theory which dominated political philosophy until the Enlightenment. The human race was seen as only a link in the Great Chain which extended from God to his lowest creation in a series of interdependent gradations. The Universe had been constructed by its Creator on the plenitude principle, which meant that everything in existence was of use to the whole and everything useful was already in existence. This left room for neither dissatisfaction nor improvement; it was a tight little package to be used as a weapon against egalitarian movements (Pole, 1978, pp. 3-4).

It is on such a basis that Marcus Aurelius, the Roman Emperor, and Epictetus, the Greek-Stoic slave of Rome, saw themselves as condemned to the inequality of their stations (Hawkins, 1977, p. 3). The Stoicism shared by Marcus Aurelius and Epictetus was a philosophy of endurance rather than hope (Russell, 1945, p. 262).

It was also on this basis that the Church could align itself in an elaborate hierarchical fashion, and, taking recourse to St. Paul's doctrine that secular power was

invested with divine authority, come to terms with the State (Pole, 1978, pp. 5-6).

Although St. Paul preached the equality of all men, he imagined it being exemplified only in heaven (New English Bible, 1961, p. 346) as seen in Colossians 3:22 where he compels slaves to "give entire obedience to your earthly masters" to claim your heritage in heaven. In St. Augustine's lottery of devine grace each person had, a priori, an equal chance of reaching heaven independent of earthly stations (Hawkins, 1977, p. 4). Each man's soul was seen to be unique in its possession of three faculties: intellect, will, and memory. Although consciousness was said to come from sensible experience, knowledge of the universal order came from God's inner light and each man possessed these innate intelligible truths (Fuller & McMurrin, 1960, p. 355). He further held that God arbitrarily divided man into the select and the reprobate since all men deserve damnation, an idea giving those of lower status no room to complain; thus the Great Chain theory was perpetuated (Russell, 1945, p. 362).

The Great Chain was not in absolute control of the field throughout the period pre-dating the Enlightenment. J. R. Pole asserts that when the fifth-century Sophists of Athens argued that all men were equal in sharing the faculty of reason, an idea contrary to all prevailing thought, "they hit on a theme that could have been developed separately from the more general principle of equality but which never afterwards failed to become entangled with it" (Pole, 1978, p. 6).

He goes on to say that although sharing the faculty of reason did not necessarily mean sharing it in equal degrees, the importance of the Sophists' contention "was that it insisted on a common humanity made explicit through a common faculty" (Pole, 1978, p. 6). It was egalitarian in that it contradicted the heretofore unheard of idea that different endowments of reason, or for that matter any faculty, constituted the sum of the differences between those who ruled and those who obeyed. It was probably the most serious attempt to extricate arguments about the natural possession of intelligence from arguments concerning equal rights under Divine or Natural Law; the two have remained interlocked for over 2,000 years.

None were to give consequential challenge to the right of the naturally superior to rule the naturally inferior until Marsilius of Padua (1270-1342) and Nicholas of Cusa (1401-1464) argued that the legislative body is the majority, and the majority has the right to punish princes (Pole, 1978, p. 7; Russell, 1945, p. 470). What occurred instead as Western Europe slipped into the Dark Ages (C.A. 500-1200) is the rise of Mohammedan philosophers who give a fresh and powerful impetus to Aristotelean philosophy. The Moslem conquest, which began immediately after Mohammed's death in 632 and transpired with great rapidity, established an Arab Empire which thrived while Western Europe stagnated. With the crusades, called for by Pope Urban II after the fall of Jerusalem to the Seljuk Turks, Western Europeans

came into close contact with the Moslem world, and among other acquisitions came the ideas of the Mohammedan philosophers (Kantor, 1963, pp. 316-317). Two philosophers whose writings were translated from Arabic to Latin were Avicenna (Ibn Sina) (980-1037) and Averroes (Ibm Rushd) (1126-1198), both physicians by trade. Although from opposite ends of the Moslem Empire, Avicenna being Persian and Averroes a Moor, they both followed the philosophical path of Aristotle (Russell, 1945, pp. 424-426). Averroes gave to Aristotle a reverence accorded usually only to religious founders. Both men wrote of the eternity of the universe and the procession from God of a hierarchy of intellects, an obvious reiteration of the Great Chain (Fuller & McMurrin, 1960, p. 385).

Although Arabic philosophy is not important as original thought, the commentations of men like Avicenna and Averroes had more impact on Christian thought than on Moslem philosophy. Averroes was translated into Latin in the thirteenth century by Michael Scott, and his influence was profound both on the scholastics of the Franciscans and professional philosophers at the University of Paris as well as among a large body of unprofessional thinkers (Russell, 1945, p. 427). Thus, the cause of equality and its relation to intellect was given no chance for a reanalysis throughout the Middle Ages which lasted until approximately 1500.

It is in the roots of the Enlightenment that a shift from conventional ideas of equality finally became apparent.

Although the Age of Enlightenment is associated with the eighteenth century, the real impetus for change occurred in the previous century (Nakosteen, 1965, p. 254). In the early part of the seventeenth century Rene Descartes (1596-1650) while postulating mind-body dualism and driving the ghost from the extended mechanism, left the mind, the unextended portion of man, still under the control of innate ideas (Matson, 1966, p. 6).

The reactions to Descartes and others of his genre from Britain's empiricists is an historical milepost of inestimable importance both to the social sciences in general as well as to the nature-nurture controversy specifically. Regarding the nature-nurture controversy the significance is twofold. First, it is the introduction of a strictly environmentalist position into the historical process in both the question of the origin of intelligence and that of political equality. Richard Herrnstein deems this tradition as the prime source of the controversy, (Herrnstein, 1974, p. 10) apparently, because there were no previous environmentalist stances of such magnitude and historical influence. Secondly, the British empiricists made a contribution to the social sciences which was to become an ironic double-edged sword in its implications for the scientific rationale of racism and innate intellectual inequality. That contribution was a difference in methodological approach to the study of man and society. From the time of Aristotle the laws of deductive logic

played a preeminant role in a science which constructed a vast edifice of deduction pyramided upon a pin-point of logical principle. The empiricists, on the other hand, drew conclusions only after broadly surveying many facts, raising empirical data to an exalted position from which it remains unseated (Russell, 1945, p. 643). In the hands of empiricists like John Locke (1632-1704) and David Hume (1711-1776) this change in method formed a basis for equality firmly founded in a modern context of scientific logic and procedure. However, empiricism in conjunction with contemporary advances in the physical and mathematical sciences, especially the publication of Newton's Principia in 1687, inoculated the Western mind with the attitude that "hard" science positivistic in nature was the key to the secrets of the universe; an attitude which when applied to the anthropology and psychology of the late nineteenth and early twentieth centuries and taken to the reductio ad absurdam came to foreshadow racism in a pseudo-scientific garb.

The empiricism of Locke and Hume warrants a closer look because of its historical significance.

Locke's influence was far broader than that of the other empiricists. Bertrand Russell calls him the "apostle of the Revolution of 1688" in England but this sobriquet need not be limited to one revolution (Russell, 1945, p. 604). He gave ethical and moral legitimation to egalitarian doctrines which became the basic tenents for American

Revolutionaries like Thomas Jefferson. In the Declaration of Independence, Locke's "Life, liberty and estate" became "Life, liberty and the pursuit of happiness," a statement for which equality of rights is a necessary prerequisite (Pole, 1978, p. 9). In the opening statements of Locke's An Essay Concerning the True Original, Extent, and End of Civil Government (also called The Second Treatise of Government) he declares his position on equality of races in the following statement which serves as a recapitulation of his First Treatise of Government.

> ...the knowledge of which is the Eldest Line of Adam's Posterity, being so long since utterly lost, that in the Races of Mankind and Families of the World, there remains not to one above another, the least pretence to be the Eldest House, and to have the Right of Inheritance. (Locke, 1960, p. 307)

To Locke, then, the natural state of nature was a state of equality:

> there being nother more evident, than that Creatures of the same species and rank promiscuously born to all the same advantages of Nature, and the use of the same faculties, should also be equal one amongst another without Subordination or Subjection. (Locke, 1960, p. 309)

His political rationale was based on his view of the nature of man as put forth in An Essay Concerning Human Understanding in which he went to great lengths to strike down the case for native ideas. Emerging from this logical structure of human understanding is the now famous concept of tabula rasa.

> All Ideas come from Sensation or Reflection - Let us then suppose the mind to be, as we say, white paper, void of all characters, without any ideas: How comes it to be furnished? Where comes it by that vast store which the busy and boundless fancy of man has painted on it with an almost endless variety: Whence has it all the materials of reason and knowledge: To this I answer, in one word, from EXPERIENCE. (Locke, 1974, p. 10)

Thus, the source of individual differences comes from without and transcends any preordained categorization.

> Men then come to be furnished with fewer or more simple ideas from without, according as the objects they converse with afford greater or less variety; and from the operations of their minds within, according as they more or less reflect on them. (Locke, 1974, p. 12)

The argument of whether or not there is a racial propensity for lower intellect over the variety of individual differences resurfaces with a great force in the population genetics of the twentieth century but in a mathematical rather than philosophical framework.

David Hume's importance to our history here lies in the dead end he represents for empiricism (Russell, 1945, p. 659). His subjectivist skepticism brought empiricism to its logical conclusion, and he is seen as the last great British philosopher by those who view Kant as his intellectual successor (Boring, 1950, p. 187).

Hume supported the basic views of Locke, though he felt that Locke was sometimes loose in his definition of terms. He also attributed individual differences in ideas to cultural or environmental deprivation of sensation; an attribution which also accounted for racial differences:

> It is readily allowed, that other beings may possess many senses of which we can have no conception; because the ideas of them have never been introduced to us in the only manner by which an idea can have access to the mind, to wit, by the actual feeling and sensation. (Hume, 1974, p. 318)

This, says Hume, is why "a Laplander or Negro has no notion of the relish of wine" (Hume, 1974, p. 318).

The mind or self as Hume defines it is nothing more than a bundle of perceptions and our a priori assessment of causal relationships mere subjective impressions of what we perceive as order in a material world, itself a subjective function of human understanding (Russell, 1945, p. 663). Though Hume completed the annihilation of the logical basis of innate ideas, a concept he felt to be drawn out at "tedious length" by "schoolmen" who never touched the point in question, he washed out any bridge for further development of empiricism and set the stage for the critical idealism of Immanuel Kant (1724-1804). He also provided the dialectic counterpoint for the faculty psychology of Thomas Reid (1710-1796) and, thus, the return to nativism (Hume, 1974, p. 320).

Historians of the period often differ on the impact and repercussions they attach to empiricism, but it is certain that the environmentalism of the latter half of the eighteenth century found a sympathetic home in the revolutionary ideology and budding political philosophy of Colonial America. However, against the backdrop of a slave system hopelessly interlaced with the Southern economy,

environmentalist philosophy underwent an ironic distortion in the political Weltanschauung of America in the Revolutionary era.

This process is lucidly described in an important work by Winthrop Jordan, White Over Black: American Attitudes Toward the Negro, 1550-1812. According to Jordan, environmentalism was especially attractive to Americans in the Revolutionary era, first, because "they had always lived in close dependence upon America's natural advantages," and also because, "as Americans talked increasingly of the rights of 'man'--natural rights--they were impelled to take an environmentalist approach to the differences among men" (Jordan, 1969, p. 288). The postulation that the differences among men were circumstantial and that the core of human nature was basically the same provided a peremptory connection between environmentalism and the political ideology of the Revolution (Jordan, 1969, p. 289).

> Locke's principles and the Glorious Revolution of 1688-89 itself served as the lodestar of American political thought when colonials began resistance to unpopular imperial measures. From the "liberties of Englishmen" it was an easy step to the universalist assertion that all men had a right to be free. (Jordan, 1969, p. 289)

The natural rights theory was a strong argument for the end of Negro slavery, though by the time of the Revolution the concept was still permeated by religious feeling. The secularization of the natural rights justification for equality was an intellectual shift of major proportions

with a negative impact on any rationale that included racial equality under this "universalist" principle. Especially after 1740, natural rights were seen as political in content, and the relationship of individual to community became increasingly governed by the sanctions of impersonal law and ruled through litigation (Jordan, 1969, pp. 294-295). As Jordan puts it, "whereas traditional Christian equalitarianism had demanded his [the Negro's] right to participate equally in an eternal community, political equalitarianism threw into question his legal relationship with his master" (Jordan, 1969, p. 295). By itself this legalistic view of man afforded dangerously weak leverage against such a massive institution as Negro slavery (Jordan, 1969, p. 295). As the Revolutionary era was coming to its climax, the rights of the Negro were nowhere near the top of the priority list of rights to be won.

The distortion of environmentalism became complete with the interpretation of Locke's life, liberty and "estates" to include the Negro among the list of possessed properties. With no clear distinction between "human" and "property" rights, the Negro was seen as property acquired under legal sanction to be disposed of at the will of the master (Jordan, 1969, pp. 350-351).

In the figure of Thomas Jefferson we see the predicament of the political philosopher who believed in natural rights while simultaneously owning slaves. Gary Wills describes the paradox of Jefferson as "elitist in practice,

egalitarian in principle" (Wills, 1978, p. 7). Jefferson, however, never considered the rightful enslavement of Negroes and often authored denunciations of the institution (Wills, 1978, pp. 7 & 432). Historians have often emphasized Locke's influence on Jefferson, and where natural rights are concerned the emphasis is rightly placed. However, Wills contends that the men of the Enlightenment who had the greatest impact on Jefferson the empiricist were not of the British school, not men like Locke, but rather men like Thomas Reid (Wills, 1978, p. 180). Reid is classified as a faculty psychologist in that he believed in the innate powers of the mind. He broke the intellect down into six active powers, including perception, judgement, memory, conception, and moral taste (Wills, 1978, p. 205). Although Reid and Jefferson after him felt that in the moral faculty all men, including black men, were equal, both saw the black man as intellectually inferior. Wills feels that it is in the moral sense, morality being considered the highest faculty by the Scotsman as well as the American, that the Declaration phrase "all men are created equal" was directed (Wills, 1978, p. 223). Otherwise, there would hardly be a basis for some of Jefferson's subsequent statements which include the following:

> Comparing them by their faculties of memory, reason, and imagination, it appears to me, that in memory they are equal to the whites; in reason much inferior, as I think one would scarcely be found capable of tracing or comprehending the investigations of Euclid; and that in imagination they are dull, tasteless and anamolous. (Jordan, 1978, p. 436)

He also felt that blacks admitted this inferiority by lusting after white women as an orangutan lusts after black women (Wills, 1978, p. 219). Jefferson's attitudes were reflected in his ideas of an education system in which "twenty of the best genuises will be raked from the rubbish annually" and be instructed at public expense, as far as grammar schools go. The twenty were to be chosen by written examination (Pole, 1978, p. 120). This also reflects Reid's influence on education which maintained a stranglehold on U.S. education for 100 years.

Though one may attempt to defend the paradox of the equality statement in the Declaration of Independence and the simultaneous existence of slavery by asserting moral equality as the true foundation of the Declaration, we still see the overriding belief in the innate inferiority of blacks instilled in the foundations of American belief; a belief which was used to justify a caste system.

Jefferson can hardly bear the sole blame for his paradoxical existence given the attitudes of the day. Even David Hume was "apt to suspect the Negroes to be naturally inferior to the whites," since there was never a civilized nation of that complexion (Wills, 1978, p. 219). Many believed that offspring had resulted from the union of black women and orangutans, and these reports puzzled the great systemizer Comte de Buffon, in his effort to place the orangutans in relation to other species. Diderot tells the story of Cardinal Polignac at the Paris Zoo addressing

an orangutan, which Jefferson had also observed, by saying, "But speak and I baptize you" (Wills, 1978, p. 220). Dr. Benjamin Rush, himself an influence on Jefferson, cast the blackness of Negroes as an illness, thinking that black skin was a form of leprosy; if the leprosy could be cured the blackness would disappear (Commager, 1978, p. 24).

Ronald Sanders believes that even Locke authored slavery legislation in Colonial America via "The Fundamental Constitutions of Carolina" drawn up in 1669 under the direction of the first Earl of Shaftesbury, to whom Locke was private secretary (Boring, 1950, p. 170). In the "Fundamental Constitutions" according to Sanders is the sentence, "every freeman of Carolina, shall have absolute power and authority over his Negro slaves." Sanders continues that "it is a surprise, however, when we realize that the principal author of the 'Fundamental Constitutions' was John Locke"(Sanders, 1978, p. 362). At this moment, the black slave was morally invisible even to a man who was soon to emerge as one of the great libertarians of his generation. Sanders feels that Locke's views changed over the next twenty years and his predecessors and followers in the colonies would vehemently attack slavery as an institution, but that this only demonstrates the "utter darkness into which the English conscience had plunged concerning the slavery question" (Sanders, 1978, p. 362). Given the originality of some of the theories of man, any arguments to the contrary must have seemed drab at best and absurd at worst.

With the ratification of the constitution political philosophy became extraneous as the wheels of litigation began to turn, and the standing of races became a matter of legislation regardless of philosophical forces. Legal points on racial standing and its relation to the Constitution have been court tested under strict rules of interpretation, each with serious consequences (Wills, 1978, p. xxv). However, the damage was done. Slavery as an institution was given legal sanction. Eugene Rostow describes the impact of the institution thusly:

> As the institution of slavery crystallized, it affected the status of all Negroes, even the freed Negroes living in the North.
>
> Thus a poison entered our lives and pervaded every aspect of them. The Negro was forced to wear a badge of degradation which only the proudest spirits could totally reject or ignore. Self-hatred, a lack of self-respect and self-confidence, inevitably colored almost every Negro's estimate of himself. The effect of our caste system has been almost worse for the Master Race. Both White and Negro Americans were schooled in habits which grip us still as corrosive memories. (Rostow, 1978, p. 23)

It is beyond the scope of this work to trace the legal history of the status of the Negro in American society, but neither is it necessary in terms of the nature-nurture question. The point has been made. At the birth of our nation, the hope of equality for blacks was stillborn. Our national ideal was based on the proposition that all white men are equal and the black man is subservient due to an innate inferiority to whites. Even the Declaration of Independence, which, according to J. R. Pole, "is the

single most central statement of equality in American history from which all others must take their bearings," had been given a racist slant in interpretation (Pole, 1978, p. 51).

The U.S. Constitution followed suit by excluding Negroes from the rights of citizenship, an interpretation that was reaffirmed in 1857 by Chief Justice Taney in the Dred Scott Case. Taney concluded that no state had the right to "introduce any person, or description of persons, who were not intended to be included in the political family, which the Constitution brought into existence, but were intended to be excluded from it (Pole, 1978, pp. 153-154). Since Scott was a Negro, whether free or slave, he had no right to sue in a court of law.

In 1858, the year following the Dred Scott decision on August 21 at Ottawa, Illinois, the Great Emancipator Abraham Lincoln squared off against Senator Stephen A. Douglas in front of twelve thousand people for the first in a series of public debates. Douglas opened the debate with a familiar theme: an assertion of the innate inferiority of non-white races. Douglas proclaimed that,

> this government was made on the white basis. I believe it was made by white man, for the benefit of white men and their posterity forever, and I am in favor of confining citizenship to white men, men of European birth and descent, instead of conferring it upon negroes, Indians and other inferior races. (Pole, 1978, p. 148)

Douglas went on to say that,

> I do not believe that the Almighty ever intended the negro to be the equal of the white man. If

> he did, he has been a long time demonstrating the fact. (Pole, 1978, p. 148)

This theme had become an American standard, unchanged since the beginning of black American history when John Smith tells of John Rolfe's 1619 journal reporting that "About the last of August came a Dutch man-of-war that sold us twenty Negars" (Sanders, 1978, p. 289). It is a theme that remained undaunted throughout the Jacksonian era of individualism and equal protection, since Jackson never had the slightest concern for racial equality (Pole, 1978, p. 146).

It was against the backdrop of American history that Lincoln was obliged to carefully guard his reply. Lincoln, who most Americans regard as the champion of freedom and equality, attacked Douglas' belief that Negroes should be excluded from their natural rights as enumerated in the Declaration of Independence, a document to which Lincoln attached an almost mystical value (Wills, 1978, p. xix). But in the same breath he continued that "I agree with Judge Douglas that he [the Negro] is not my equal in many respects - certainly not in color, perhaps not in moral and intellectual endowment" (Pole, 1978, p. 149). The conflicts which arose from a position which included the desire to see the Negro's freedom assured by the institutions of the country but did not want to share these institutions with him intensified with the exploration of its complexities and encompassed a great civil war and subsequent bitter disputes of the rights of the Negro to participate in white

society. But even with the breakthrough of emancipation, the central theme remained unchanged; the Negro may have been given his freedom, but it was at the willingness of the white man who still believed in his racial inferiority.

Even the Civil War became a catalyst for racist doctrines--but doctrines based on a new set of assumptions; not the assumptions of abstract philosophical speculation, for the nineteenth century had become an era of new technology. It was harder science which could accurately analyze any problem and arrive at the cold, hard facts through careful data gathering and analysis based on scientific principles. For this chapter in our history we must take a different perspective.

CHAPTER III
NINETEENTH CENTURY BIOLOGY AND ANTHROPOLOGY: THE SCIENCE OF RACISM

They mean to tell us all was rolling blind
Till accidentally it hit on mind
In an albino monkey in a jungle
And even then it had to grope and bungle,

Till Darwin came to earth upon a year
To show the evolution how to steer.
They mean to tell us, though, the Omnibus
Had no real purpose till it got to us.

Never believe it. At the very worst
It must have had the purpose from the first
To produce purpose as the fitter bred:
We were just purpose coming to a head.

Robert Frost
in "Accidentally on Purpose"

For philosophy, the nineteenth century was a time when theories of man sustained clashing crosscurrents from the pens of the leviathans of the field. What greater example of an ironic dichotomy can be brought to mind than that of Friedrich Neitzsche (1844-1900) and Karl Marx (1818-1883)? The two could have hardly been more at opposition philosophically, Neitzsche, with his disdain for Jews and desire for an international ruling race, and Marx, born a Jew and upholding the equality of the masses (Russell, 1945, p. 729). Yet Neitzsche's philosophy became the ideology of Hitler and the Nazis and Marx became the father of Russian Communism; the authoritarian dictatorship and the authoritarian state.

But in other fields new methods for examining mankind were being brought to bear using the latest scientific techniques; a new science of man was being born. Men of science wished to discover and explain the differences among human beings, and inevitably the concept of race became a focal point. Racial classification was a relatively new idea in the nineteenth century.

The idea of race was, for the most part, an obscure one in western Europe until the new age of travel and discovery in the Renaissance. But myth clouded fact and no serious attempts at racial explanation were made.

Zurara, the chronicler of the travels of Prince Henry in the 1460's, attributes a religious justification of black slavery to the Moslems, black skin being an easily identifiable trademark. Noah's curse on Ham became the standard religious excuse for black slavery among Europeans as well as Moslems. Thus the concept of color as a grouping criterion distinguishing slave from master is instilled at an early stage of European expansion (Sanders, 1978, p. 63).

The Portuguese opened up the slave trade in Africa by making large scale shipping endeavors in the sixteenth century. Englishmen such as William Hawkins and Francis Drake also began to indulge in slaving during the "Guinea season" which lasted from September to May. During the other four months the miasmic littoral of West Africa became "the White Man's Grave" due to the heat (Penrose, 1955, p. 158).

When Europeans were first introduced to black people, the symbol of blackness already had a sinister connotation. In the Oxford English Dictionary before the sixteenth century, the symbol blackness included such definitions as "Deeply stained with dirt; soiled, dirty, deadly; baneful, disastrous, sinister...Foul, iniquitous, atrocious, horrible, wicked... indicating disgrace, censure, liability to punishment, etc" (Kovel, 1971, p. 62). Fed by such myths, the appearance of blacks in Europe provided a shock to the mentalities of the white man. When the lifestyles of the blacks, including nakedness and bodily freedoms became known, the fantasy of blackness was intensified independently of any concept of race.

A science of ethnology began when the philosophers of the Enlightenment became interested in arranging man and the universe in proper order. Most of these curious, enthusiastic men were scientists, Naturalists, as they would say, and they pledged allegiance and devotion to science as they understood the term. For them it was "a place for everything and everything in its place" (Commager, 1978, p. 6). As Commager puts it, "they organized, they systematized, they classified, they codified, and all Nature, the Universe itself, fell into order at their bidding" (Commager, 1978, p. 2). Carl von Linnaeus (1707-1778) ordered all the flora in his Systema Naturae, and the Comte de Buffon (1707-1788) added the rest of the natural world. Antoine R'eamur classified insects, an endeavor that took six volumes, while at Gottingen, Johann Blumenbach (1752-1840) was systematizing human anatomy.

The zero date for modern nomenclature was the tenth edition of Linnaeus' Systema Naturae. His binomial nomenclature has become the standard taxonomy of living organisms (Simpson, 1961, p. 29). Linnaeus' thinking was based primarily on Aristoteleanism and Thomism and reflected the necessity of "typing" organisms according to common characteristics. The Linnaean method of classifying the races of man according to skin color provided the basis for nineteenth century racial grouping and suitably began the science of anthropology on a modern basis. Linnaeus not only identified four races of man according to the color criterion but he also attributed to each race certain moral and intellectual qualities. In his descriptions we see a host of attributes that in subsequent racial taxonomies become more fixed than race itself. Linnaeus particularizes Homo Americanus as reddish, obstinate, contented, and regulated by custom; Homo Europaeus as white, fickle, sanguine, blue-eyed, gentle, and governed by laws; Homo Asiaticus as sallow, grave, dignified, avaricious, and ruled by opinions; and Homo Afer as black, phlegmatic, cunning, lazy, lustful, careless, and governed by caprice (Haller, 1975, p. 4).

In 1781, Blumenbach recognized five varieties of man, Caucasian, Mongolian, American, Ethiopian, and Malayan, which became the basis of most nineteenth-century anthropometrical researches. Blumenbach expanded on the Linnaean skin color criterion by adding hair, skull, and facial characteristics to his basis of division. Using these criteria Blumenbach

originated the term Caucasian from Mount Caucasus whose southern slope was inhabited by the Georgians, the race he felt to be the most beautiful in all the world. The Caucasian to Blumenbach was not only the most beautiful race but the foundation from which all other races were derived. Blumenbach's racial taxonomy was widely accepted and anthropometrists began to devise instruments to measure the difference between the races; measurements which they assumed established a gradation from the anthropoid through the varieties of man (Haller, 1975, p. 6).

The measuring and quantifying of individual differences was becoming increasingly important as science entered the nineteenth century. Most social scientists are familiar with the famous circumstances surrounding the termination of Kinnebrooke by Maskelyne at the Greenwich Observatory in 1796 and the subsequent discovery of the personal equation by Bessel (1784-1846), the astronomer and mathematician at Konigsberg. Although Bessel's formula had a legitimate use in astronomical measurement (Boring, 1950, pp. 134-138), other inventions and discoveries provided damning evidence as to the inferiority or superiority of certain races by abusing scientific causal inferences.

The phrenology of Franz Joseph Gall (1758-1828) eventually led to the comparison of the Negro skull to that of apes. Gall along with Spurzheim (1776-1832), who coined the term phrenology, published works on the relationship between mental characteristics and the shape of the skull (Boring, 1950, p. 52).

Earlier Petrus Camper (1722-1789) had suggested the use of the facial line or facial angle as a tool in comparative craniology, and indeed his work provides a starting point for modern craniometry. His Dissertation was published by his son two years after Petrus' death. It included the following procedure as the method for determining facial angle: a horizontal line was established by aligning the orifices of the ears with the lowest part of the nasal aperture. A line was then drawn from this point of reference grazing the front surface of the first incisor tooth and the forehead providing the facial line. If the forehead sloped or the jaw projected, the facial angle was necessarily small. This craniometric method allowed Camper a tool with which to compare the races of man with the apes and monkeys. In his Dissertation his facial angle figures are as follows: monkey 42^{o}; oranguatan, 58^{o}; a young Negro 70^{o}; a European 80^{o}. With this index Camper placed the Negro closer to the ape than the European in terms of skull structure and facial appearance (Baker, 1974, p. 28).

In his Treatise on Man and the Development of His Faculties, Lambert Adolphe Jacques Quetelet (1796-1874), the acclaimed father of social statistics, believed that the facial angle demonstrated a relationship between intelligence and the standard for beauty in humans (Quetelet, 1969, p. 98). Although Quetelet was considered a liberal democrat/socialist, he was seduced by Saint-Simonist doctrine which approximates modern technocracy and runs counter with individualism. This

is reflected in Quetelet's concept of L'homme Moyen or "Average Man" which was a product of mass statistics based on individual differences but overriding concern for the individual. His doctrine of human variability due to accidental causes, anticipating Darwinism, emphasized common qualities of men (Diamond, 1969, pp. vi-vii).

Quetelet's statistical theories provided a scientific basis for anthropometric investigation in the American Civil War; investigations which were an oppugnant force to the original cause for the war (Haller, 1975, p. 11). The concept of "average man" and the "law of accidental causes" became known to Sir Francis Galton, and in his aristocratic hands the cause of racial equality suffered further setbacks (Diamond, 1969, p. xi).

So, out of phrenology and facial angle techniques, nineteenth century craniometry became the new science of man with uses ranging from studying fossils to separating races. Its real spokesman was Paul Broca (1824-1880), the inventor of the cephalic index for studying cranial characteristics (breadth of head/length of head x 100 = C.I.). Broca invented many of the instruments used for craniometric measurements. In 1860 he invented the craniograph, in 1864 the goniometer for measuring facial angle, in 1867 the stereograph, in 1870 the occipital goniometer (for measuring the angle of the back of the head) and the phenoridal. One must peruse five volumes of his Memoirs d'Anthropologie for descriptions of all the instruments he invented (Barzun, 1937, p. 161). Although

there was some skepticism surrounding craniometry and even Broca admitted that such external causes as childhood disease could cause deformation of the skull, it became widely used as a means of separating the races (Haller, 1975, p. 15).

Beginning in 1840, Andres Adolph Retzius modified and extended the experiments of Camper and Quetelet. He made extensive use of the facial angle, and in a survey of races from the evidence of cranial materials published in 1856, Retzius distinguished orthognathic European dolichocephals, such as Norwegians, Burgundians, Franks, Germans, Celts, Welsh, and ancient Greeks, from orthognathic brachycephals which included Laplanders, Finlanders, Slovaks, Russians, Albanians, Basques, and Modern Greeks. The dolichocephalic races of Asia were separated into the orthognathic (Hindus, Arian Persians, Arabs, and Jews) and the prognathic (Mongolians, Manchu Tartars, Samoyeds, and Yokuts). All Australian Negroes were prognathic dolichocephals, while Malays, Polynesians, and Papuans were prognathic brachycephals. In the Americas, dolichocephaly was predominant in the eastern portions of North and South America, brachycephaly being the rule following the west coast down to Tierra del Fuego (Voget, 1975, p. 126).

Retzius' survey was based on museum and private collections of skulls, and he drew heavily on the American Dr. Samuel Morton's Crania Americana of 1839. In his survey Retzius fully developed the cephalic or cranial index, and its use aided the rapid rise of anthropometry since the cranial

index was readily accepted as the best measurement to determine racial differences. In his contribution to Nott and Gliddon's The Indigenous Races of the Earth of 1857, J. Aitken Meigs contended that cranial characteristics of humans represented a natural series of gradations, much like the Great Chain of Being in this pre-Darwinian era. Climatic extremes of hot and cold were thought to cause a dull uniformity of human characteristics, therefore the low forms of man were found in the arctic and tropic zones; ergo, the highest form of human life must come from the richly diverse temperate zone (Voget, 1975, p. 126).

By 1860 phrenology had suffered many academic attacks and was waning toward a death by ostracism (Haller, 1975, p. 17). It was not until near the end of the nineteenth century, however, that the use of anthropometry especially craniometry as the methodology of racial ethnology began to suffer. Topinard in 1892, Rudolf Virchow in 1896 and the American William Ripley in 1899 all expressed the dangers that could result from the careless use of such methods. Topinard accused anthropologists of confusing peoples with races and erratically viewing traits established from anthropometric measurements as fixed types. He and Virchow addressed themselves to those who, even in a post-Darwinian era when evolution should have triumphed over the typing of human traits, sought a merger of physical and cultural history. Such faulty methods they felt were misleading by making race the determinant of national greatness (Hall, 1975, p. 16; Voget,

1975, p. 127). Klemm (1843-1851) had separated races into active and passive. The European races, especially the Teutonic, were the active creators of civilization. In 1915 Comte de Gobineau interpreted the social transformation of Europe as a decline resulting from the mongrelization of the Nordic race. It was attitudes such as these that Topinard and Virchow had hoped to arrest. Although Ripley used the cephalic index in his Races of Europe, he warned of the dangers of connecting head shape with intellectual power (Haller, 1975, p. 16). The issue became so heated that in 1893 Alfred Fouillee stated that "masses of men will be massacring one another for one degree more or less in their cephalic index" (Barzun, 1937, p. 176).

Such attacks on the extravagant, unrestrained use of anthropometry came too late to salvage any scientific egalitarian theories which may have resulted from the American Civil War. The Civil War appears as an enigmatic paradox in American history when one realizes that the conflict which emancipated the slaves also provided justification for the racial attitudes of nineteenth century society (Haller, 1975, p. 20). Lincoln's reference to the inequality of the Negro in 1858 anticipated what Civil War anthropometry was allegedly to prove.

John Haller, Jr., has written that the Civil War stands as a "watershed in nineteenth century anthropometric developments" (Haller, 1975, p. 19).

> The war marks a watershed not so much because its conclusions were new but because nearly all subsequent late nineteenth century institutionalized attitudes of racial inferiority focused upon war anthropometry as the basis for their beliefs. (Haller, 1975, p. 19)

The agency which took it upon itself to amass anthropometric measurements on thousands of soldiers from both the North and South was the semiofficial organization made up of "predominantly upper-class patrician elements which had been vainly seeking a function in American society" during the Civil War--the United States Sanitary Commission (Haller, 1975, p. 19). The commission, which modeled itself after the British Sanitary Commission of the Crimean War, was called into service on June 9, 1861, after an embarrassing defeat by the Union troops at Bull Run. Their original task was to "direct their inquiries to the principles and practices connected with the inspection of recruits and enlisted men, the sanitary condition of volunteers, to the means of preserving and restoring the health and of securing the general comfort and efficiency of the troops, to the proper provision of cooks, nurses, and hospitals, and to other subjects of like nature" (Stille, 1866, p. 63). However, after "a minute inquiry into the whole subject" of Bull Run, the Commission began to expand their activities into "every conceivable aspect of 'hygiene and physiological laws'" (Stille, 1866, p. 63). Thus, in the summer of 1861 through a branch of the Commission aptly labeled the Bureau of Vital Statistics the anthropometric methods of Quetelet were applied to as many of the two and a half million soldiers involved in the war as the Commission could lay instrument to (Haller, 1975, p. 21).

In 1866 Charles J. Stille, a lawyer and member of the Sanitary Commission wrote an official history of the Commission's wartime activities. In it he devotes a chapter to the aspirations of those involved in the Bureau of Vital Statistics. He begins by warning that the "employement of statistical methods of research...must be used with great discretion, and with special limitations" (Stille, 1866, pp. 451-456). From this humble and unassuming prolegomenon an insidiously familiar ambition materializes. Since, according to Stille, statistical methodology "when properly interpreted, is continually impressing itself more and more upon students of both moral and physical sciences; and the opportunities which were presented during the war for the determination of important facts relative to the moral and physical characteristics and capacities of our soldiers, and of men in general," the Sanitary Commission was compelled "to obtain such facts as seemed important to the welfare, not merely of our own country, but of the world" (Stille, 1866, p. 452).

With this humanitarian goal at the fountainhead of its moral, intellectual, and financial resources, the Commission expanded and refined its inquiries until inevitable developments occurred. Stille describes events as follows:

> Early in 1863 a new class of examinations was undertaken, to ascertain the relative physical condition of soldiers coming from different parts of the country and of Europe. The results arrived at by these examinations will probably afford the most important contribution of observations ever made in furtherance of "anthropology," or the science of man, considered in reference to his physical nature.

> These tabulated records offer the means of intelligent and discriminating comparison between troops of different nativities, ages, complexions, occupations, etc., and between American soldiers, and those of different foreign countries, as regards their physical and social condition, and will probably furnish results of which it would be difficult to say whether their value in medical, military, and physiological point of view should be regarded as the greatest. (Stille, 1866, p. 460)

The next step could only be described as ineluctable.

> In July, 1864, Dr. B.A. Gould took charge of the Bureau,...and much more extended investigations were instituted concerning the physical characteristics of our soldiers, black as well as white...The results promise to solve many long-discussed problems of important practical bearing, such as the laws of human growth while approaching the maximum stature; of pulmonary capacity as dependent upon physical proportions and rate; of complexion, stature and previous occupation as affecting strength and endurance; together with numerous minor questions of high scientific value, as leading to the knowledge of laws controlling the development of man, and the relation of different human races. (Stille, 1866, pp. 460-462)

One can merely speculate as to the nature of these "minor questions of high scientific value" to which Stille refers, but the result of these inquiries is quite clear. The Commission used familiar instruments of measurement, including andrometer, spirometer, dynometer, facial angle, platform balance, calipers, and measuring tape (Haller, 1975, p. 23). John Haller quotes many of Gould's interpretations of the Bureau's investigations, and the immediate results seem to be a refuge for both hereditarians and environmentalists in anthropology (Haller, 1975, p. 28). Differences were noticed between free and slave state Negroes. Regarding the mulatto, a previous racist doctrine was corroborated.

Haller quotes Gould as stating that, "the curious and important fact that the mulattoes, or men of mixed race occupy so frequently in the scale of progression a place outside of, rather than intermediate between, those races from the combination of which they have sprung cannot fail to attract attention. The well-known phenomenon of their inferior vitality may stand, possibly, in some connection with the fact thus brought to light" (Haller, 1975, p. 28). The conclusion, therefore, was that cross-breeding between blacks and whites caused a deterioration in the breeding stock.

Many scientific papers originated from the activities of the Sanitary Commission, most published in England. One such paper by Sanford B. Hunt was published in 1889 in the London Anthropological Review and was entitled "The Negro as a Soldier" (Haller, 1975, p. 30). It had previously been submitted in its entirety to the Commission. In it Hunt made such statements as the "well-known imitative faculty" of the Negro, in conjunction with "his natural fondness for rhythmical movement," made him a good recruit for the drill-master (Haller, 1975, pp. 30-31). Hunt also performed autopsies on soldiers to compare the brain weights of blacks and whites, a method he assumed could possibly give a measure of the intellectual differences between the races. His work confirmed Dr. Samuel Morton's earlier assumptions, giving the white man a 5.5 to 9.5 percent advantage. Although he presumed that his autopsies could solve the nature-nurture controversy, he did at least admit that it was difficult to tell whether a

large brain created a higher level of civilization or civilization a larger brain (Haller, 1975, pp. 30-31).

The Civil War did little to change racist attitutes during the Reconstruction Era. The difference was that now there was a scientific motive for racism centering once again on the innate inferiority of the Negro in intellectual and moral capacity. The cumulative effect of a century of anthropometric developments and the historical opportunity to make massive use of them carried racial prejudice into the twentieth century where new forces were to take their toll on egalitarianism.

Nineteenth century anthropologists subjected one another to further pedantic lines of demarcation over the origins of man controversy. The monogenists held that all men had originated from a single type, while the polygenists believed that humanity had many distinct ancestors (Haller, 1975, p. 69).

Neither group was consistent within itself, each having many varied schools of thought ranging from those who upheld a strictly biblical view to the secular scientists of the day. Among the monogenists, the Adamites, a biblical group, and the rational monogenists, men like Linnaeus, George Buffon, Cuvier, and Blumenbach who did not rebuke the Bible but viewed racial differences as the result of diversities in climate and other environmental conditions, resorted to the curse of Ham to explain Negro inferiority (Haller, 1975, pp. 70-71). The transformists relied on Jean Lamarck's (1744-1829) teachings for their theory. To them man was the

offspring of a slow transformation of apes and occupied the extremities of the tree of life (Haller, 1975, p. 71).

To the monogenists races had become "fixed" through centuries of inbreeding in geographic isolation (Haller, 1975, p. 73). Because of this monogenists were generally not egalitarians. Races had acquired their own distinct characteristics during their formation period, and they found the inferiority of the Negro impossible to deny. Radical Jeffersonians in America were an exception since they saw monogenism as a reason to uphold the "self-evident truth that all men are created equal" (Haller, 1975, p. 74). Unfortunately this represented no more than the inclination of a few and the monogenists in general argued that Jefferson's postulate remained rhetorical, since scientifically speaking the races were anything but equal.

The polygenists were no more unified in belief than the monogenists. The neotraditionalists, like Paul Broca, upheld the biblical view of creation except to them Adam and Eve represented the creation of the Jewish race and other races were created in different locales (Haller, 1975, p. 74). A second group adhered more closely to a mosaic cosmology. Regarding the time of creation described in the Bible as insufficient to produce so many races, they too upheld multiple creation, but along a more expanded temporal cosmos. A third group was related to the Lamarckan monogenists. They too accepted man as the transformation of antecedent species, but they felt that each race came from a different antecedent--the

Americans from the broad-nosed Simians of the New World, the African from the Troglodyte, and the Mongolian from the Orangs (Haller, 1975, pp. 76-77).

To the polygenists and the monogenists races were "fixed" as separate species and did not naturally cross-breed. This concept was essential to those nineteenth century scientists who maintained faith in the Great Chain of Being. An unnatural crossing of races upset the balance of worldly order and produced a "mongrel" form of man, thus reducing fecundity or resulting in complete sterility (Haller, 1975, pp. 76-77).

In America as in Europe intellections of race inferiority were entrenched in both the polygenic and monogenic bastions of science. However, even before the Civil War polygenists like Dr. Samuel Morton and Louis Agassiz thrust themselves into eclat by arguing that the Negro was not only a separate species but fixed in that species, and no environmental modification or period of time could make him the white man's equal. The Negro as a species was destined for slave status (Haller, 1975, p. 77).

Fortunately, the origin of man controversy suffered a sudden death blow, although the effects of its swift demise took some time to reach all the necessary parties. In 1859 Darwin's The Origin of Species By Means of Natural Selection or the Preservation of Favored Races in the Struggle for Life was published a year preceding the opening battle of the Civil War.

The regnant force of Darwin's monumental work has had such diffuse influence on Western thought as to render any

brief discourse on the subject humorous by the most generous criticism. However, there are elements of Darwinian thought which provide an interdisciplinary fulcrum to the study of the races of man and their attributes.

The publication of The Origin of Species along with the foundation of the Anthropological Society in Paris, under the leadership of Paul Broca marks the division between the old "descriptive" anthropology and the new "scientific" anthropology (Barzun, 1937, p. 159). The new generation of anthropologists no longer felt it necessary to attune their scientific theories to scriptural interpretation (Barzun, 1937, p. 159). Herein lies the essence of the Darwinian revolution. Darwin's contribution was not the introduction of the theory of evolution, since that was already an old idea in biology. Darwin himself named over thirty predecessors to the theory and was still often accused of ignoring his contributors (Lewontin, 1974, p. 4). Greek thinkers had maintained the belief that life had gradually emerged from cosmic pits of primordial slime. Diderot, Buffon, Maupertius, and Lamarck are names associated with some brand of evolutionary theory in the eighteenth century, prior to Darwin. Darwin's own grandfather, Erasmus, had expounded evolution in verse:

> First, forms minute, unseen by spheric glass,
> Move on the mud, or pierce the watery mass.
> These, as successive generations bloom
> New powers acquire and larger limbs assume.
> (Burrow, 1976, p. 27)

Furthermore, Alfred Wallace arrived at this theory simultaneously, and he and Darwin jointly presented their papers to the

Linnaean Society, Nor was the revolution centered on the accentuation of natural selection as the prime perpetuating force in evolution, since this cannot be empirically proven. The real essence of the revolution was the replacement of a metaphysical outlook on variation among organisms by a materialistic view (Lewontin, 1974, p. 4).

The Platonic and Aristotelean concept of the "ideal" or "type" to which concrete objects were imperfect approximations had dominated pre-Darwinian thought. The degree to which an individual case varied from the ideal was a measurement of nature's imperfection (Lewontin, 1974, p. 4).

Harvard Zoologist Richard C. Lewontin describes the importance of the transition in emphasis initiated by Darwin in the following passage:

> Such a metaphysical construct is not without importance in science, as Newton's mechanics prove so well. The first law in the De Motu Corporum is that
>
> > Every body perseveres in its state of rest, or of uniform motion in a right line, unless it is compelled to change that state by forces impressed thereon.
>
> The metaphysical introduction of ideal bodies moving in ideal paths, so essential to the proper development of physics and so consonant with the habits of thought of the seventeenth century, was precisely what had to be destroyed in the creation of evolutionary biology. Darwin rejected the metaphysical object and replaced it with the material one. He called attention to the actual variation among actual organisms as the most essential and illuminating fact of nature. Rather than regarding the variation among members of the same species as an annoying distraction, as a shimmering of the air that distorts our view of the essential object, he made that variation the cornerstone of his theory. (Lewontin, 1974, p. 5)

Theoretically the Darwinian revolution supplanted many heretofore unchallenged cardinal tenets of racial doctrine. His act of scriptural heresy abrogated the origin of man controversy, inculcating a materialistic monogenism. By emphasizing individual variation, he removed the intellectual support for the concept of an "ideal" racial "type" against which all other races are measured. The idea of man as a dynamically evolving organism in perpetual metamorphosis extirpated any conviction of the "fixity" of races with their inefficacy for change under any environmental conditions. Finally, by accepting the notion that environmentally induced characteristics could be transferred into qualitative disparities of phylogenic inheritance, evolutionists implicitly denied the Lockeian premise of tabula rasa, the basis of the totally environmentalist position (Voget, 1975, p. 174). It is at the Darwinian crossroads that many theoretical corollaries, by the degree of their contiguity with evolutionary theory, caused a branching of the social sciences.

Although Darwin's theories were revolutionary from a retrospective viewpoint, he was still a product of his time, and, therefore, had drawn his own empirical conclusions concerning man's racial differences. It must be remembered that Darwin was a contemporary of Broca, whom he felt to be "a cautious and philosophical observer," as well as others in the field of quantitative anthropology (Barzun, 1937, p.161).

Darwin saw racial differences as variation of groups as a result evolutionary branching from a monogenetic source.

His rationale for monogenism was that "all the races agree in so many unimportant details of structure and in so many mental peculiarities that these can be accounted for only by inheritance from a common progenitor" (Voget, 1975, p. 174). Furthermore, the races could be ranked on an evolutionary scale by noting the observed differences in morality and intellect between the " highest men of the highest races and the lowest savages," which according to Darwin, "are connected by the finest gradations" (Voget, 1975, p. 175).

Darwin further contended that it was possible to rank the various races according to the size of the head: the smaller the head, the lower on the evolutionary scale. Europeans ranked higher in cranial capacity than American Indians, Asiatics, and Australians. Not only were the brains of Europeans larger but the extra size was found in the frontal area of the skull which housed the higher faculties of the intellect (Voget, 1975, p. 175).

Where races were in competition, natural selection usually eliminated the less civilized groups, since the "grade of their civilization seems to be the most important element in the success of competing nations" (Voget, 1975, p. 175). Therefore, Darwin, whose theories neutralized or liquidated many racial doctrines and provided a wellspring for new research, believed that the races had evolved to different levels of intelligence which accounted for for their respective levels of civilization and potential for success in competition with one another.

The Social Darwinists, lead by Herbert Spencer, used Darwinian theory as a scientific endorsement for their brand of sociology (Burrow, 1976, p. 44).

The Social Darwinists took a hard line stance on equality on any grounds. They made no distinctions between biological development and sociological or psychological development.

> Like the later Freudian psychoanalysts who argued 'for innate action-patterns or specific human instincts as underlying cultural activity,' so the Social Darwinists linked up the stages of cultural evolution with corresponding stages in psychical or mental development. (Haller, 1975, p. 122)

If a particular race dominated another, in any fashion, it was because that race had evolved to that position. After all, it was Spencer, not Darwin, who had coined the phrase "the survival of the fittest." In a letter to Alfred Wallace, Darwin objected to the phrase by saying, "it cannot be used as a substantive governing a verb"; in other words, it was a nice slogan, but not the essence of an universal theory (Hawkins, 1977, p. 54).

> The Social Darwinists seem to have ignored Darwin's qualification of the "struggle for existence" which he says is used "in a large and metaphorical sense, including dependence of one being on another, and including (which is more important) not only the life of the individual but success in leaving progeny. (Burrow, 1976, p. 116)

Nevertheless, the Social Darwinists pedantically proclaimed the the phrase "survival of the fittest" and, in conjunction with the vital tenet of a transformation of evolutionary energy into mental and social power in the natural competition for survival,

they found no place for the maladaptive, since the natural forces transcend moral considerations. According to Herbert Spencer, those who survived the brutal ravages of nature emerged with superior mind, body, morality, and lifestyle. The savage races, then, would forever remain a social liability. They would always be objects of profligate waste by those who would raise their standards through superfluous educational cultivation.

Critics of Social Darwinism, like T.H. Huxley, Darwin's "bulldog," said that Spencer concocted his ideas from his "inner consciousness rather than empirical data," but Social Darwinism persisted to its reductio ad absurdum in Nazi Germany. As recently as 1975 when Harvard Professor Edward O. Wilson attempted to place mankind in relation to the rest of the animal kingdom in his book Sociobiology: The New Synthesis he was attacked as a Social Darwinist (Leakey, 1977, p. 33). We shall return to the new sociobiology later.

It is ironic and mystifying that Darwin's work could offer intellectual sustenance to nearly every aspect of "nature of man" theories most of which viewed evolution as teleological. The Social Darwinists were linked with the craniometrists through men like the American John Fiske who used brain size as the pivotal difference in racial intellect to support " survival of the fittest." As president of the Immigration Restriction League in the 1890's, he sought to perpetuate an enduring image of a natural Anglo-Saxon birthright in America (Haller, 1975, p. 133). Social Darwinism invaded sociology in America

through men like William Graham Sumner, who felt that "millionaires are the product of natural selection," a sentiment which fell sweetly on the ears of Andrew Carnegie. The concept of "survival of the fittest" lent itself to the political aspirations of Theodore Roosevelt as well as to the British imperialists of the late nineteenth century. English political theorist Walter Bagehot fed imperialists with the idea that lower civilizations are savages with strong passions and weak reasoning power ripe for Anglo-Saxon guidance. War as a biological necessity was a byline of German military thinkers who helped set the stage for World War I. This idea, filtered through faddish popularizations of the day and the superrace philosophy of Nietzsche, nurtured thoughts of racialism, nationalism, and anti-semitism in the young Hitler. Yet, even Marx and Engels anchored the class dialectics and war to what they believed to be its biological counterpart in Darwinism. Darwin, however, respectfully declined the honor of having the English edition of Das Kapital dedicated to him.

Although racial doctrines had thoroughly permeated European and American thought through developments in anatomy, physiology, and anthropometry long before Darwinism and even though Darwin never endorsed the application of his theory to social or political contexts, "it provided a kind of crucible into which the fears and hatreds of the age could be dipped and come out coated with an aura of scientific authority" (Burrows, 1976, p. 45). The Darwinian crucible is a bit worn from constant abuse, but it is still very much in use, as later chapters in this work will attest.

CHAPTER IV
A BRANCHING PATH: GENETICS VS. EUGENICS

From fairest creature we desire increase,
That thereby beauty's rose might never die.

William Shakespeare
in "Sonnet I"

While Darwin was hurriedly writing down his theory of evolution so as not to be preempted by Alfred Wallace, Moravian born Augustinian monk Gregor Johann Mendel (1809-1884) was beginning eight years of experimentation in the cross-breeding of garden peas. There had been earlier attempts at hybridization studies, but few researchers were as meticulous as Mendel in planning their experiments (Winchester, 1972, p. 34).

The earliest plant hybridization experiments date from the time of Thomas Fairchild's cross between a carnation and a sweet william in England in 1717, and Cotton Mather's cross between a squash and a gourd in America in the same year. Fifty years of plant breeding in Europe were culminated by Josef Gottlieb Kolreuter (1761-1766) in Germany by the publication of his works describing over 100 experiments in artifical hybridization.

Livestock breeding was developed mainly by Robert Bakewell in England in 1760. His work over a 35 year period became a wellspring for many modern breeds of livestock.

These early works influenced both Darwin and Mendel, but whereas Darwin concentrated on translating artificial selection into natural selection, Mendel focused on the nature of hereditary determination (Spiess, 1977, p. 6).

Mendel chose garden peas because the seeds of pure-breeding varieties were easily obtainable and they are self-pollinating so that crosses are easily controlled. He set up a garden inside the monastery at Brunn, Austria (now Brno, Czechoslavakia) where he taught and using the seeds of 22 different varieties of peas conducted eight years of carefully planned experiments. He kept thorough records and continued the crosses until he collected vast quantities of data which yielded ratios with statistical validity (Winchester, 1972, p. 34).

Mendel correctly chose to study characteristics with discontinuous variation: the pea plants were either tall or short, never of medium height. A first cross between tall and short plants provided plants which were all tall, but a cross between these second generation plants yielded offspring which were three-fourths tall and one-fourth short (1/4AA: 1/2Aa:1/4aa). Mendel proposed an explanation for this phenomenon which is precisely that which is accepted today. Each parent contributed a set of "formative elements" to the offspring and the tall elements are "dominant" over the short elements which are said to be "recessive" (Ehrlich&Feldman, 1977, pp. 101-102). (Mendel did not coin the term gene; that was a concept of Danish geneticist Ludwig Johannsen in 1903.) The

short elements will be phenotypically expressed only when each parent contributes a recessive; today we say the offspring must be "homozygous" for that element. This is the essence of what is called Mendelian or genetic segregation.

Mendel may have been an extremely capable researcher, some have called him a genius, but unfortunately, he was also very poor. He was born of peasant parents and had accepted the humble life of a monastic priest. He was, therefore, limited in his ability to share his works. He presented the results of his eight year project to the Natural History Society of Brunn, and his findings were published in the Annual Proceedings of the Natural History Society of Brunn in 1865. Paul Ehrlich has said that this was like a modern physicist stating an important theory in the Transactions of the Missouri Dairyman's Association. As a result the theory lay dead for the remainder of the nineteenth century (Ehrlich, 1977, p. 100). Mendel did send a copy of his paper to the Swiss botanist von Nageli who had genetic theories of his own and ignored Mendel.

Mendel provided an important link to Darwinism although the connection has been inappropriately construed in many cases. An accurate conception of genetic transmission was unknown to Darwin. He had hypothesized the existence of "gemmules" which contained minute yet precise copies of each body part gathered by the bloodstream and deposited in the sex organs (Winchester, 1972, p. 21). When the Mendelian theory of particulate inheritance was rediscovered it refuted Darwin's "blending

theory," that offspring were a blend of parental "gemmule" contributions. Mendel's postulate with the emphasis on discontinuous mutations also initially cast a shadow on Darwin's reliance on natural selection, since mutation and not selection was emphasized as the force behind evolution. The synthesis of Mendelian genetics and Darwinian evolution did not occur until the 1930's when genetics could explain environmental influences on gene-combinations (Burrows, 1976, p. 47). Originally Mendelian theory was based on the initiation of evolutionary paths through the action of random mutations with the environment as survival parameter, whereas Darwinism was seen as teleological since the primacy of natural selection renders the environment an absolute determinant of evolutionary pathways. Both theories consider individual variation as central and essential (Lewontin, 1974, p. 6). This fact became the focus of one side of two incongruous scientific approaches which alienated certain factions within the young science of genetics. The result was a confusion of genetics with other movements which became disentangled in socio-political issues, and stunted the growth of the budding science.

In order to present this confusing era in genetics more clearly another scientific leviathan of the day must be introduced. In 1865, coincidentally the same year Mendel presented his findings at Brunn, Sir Francis Galton (1822-1911), an aristocratic dabbler in many fields, presented for the first time on paper his ideas concerning "the possible improvement

of the human breed under existing conditions of law and sentiment" (Dunn, 1962, p. 296). It was Galton who coined the terms nature and nurture (Selden, 1978, p. 70).

It has been said that Jules Verne may have had Galton in mind when he created Phineas Fogg, the protean protagonist of Around the World in Eighty Days. Galton, whose I.Q. was posthumously set at 200, studied medicine, biology, astronomy, meterology and anthropology. He employed himself at various interests including journalism, essay writing, mathematics, geography, exploring, boating, ballooning, general world travelling, during which time he wrote didactic tips on such helpful subjects as how to fold shirts for more efficient suitcase packing. He produced some of the first weather maps, discovered anticyclones, developed a teletype machine, invented the first supersonic dog whistle, and introduced Scotland Yard to the fact that fingerprinting is a foolproof method of identifying criminals. The latter came after he had settled upon the study of individual differences as the remainder of his life's work (Fincher, 1976, p. 159). This decision to dedicate himself to this field came when his older half-cousin Charles Darwin published The Origin of Species when Galton was thirty-seven. Galton was so captivated by his cousin's achievement that he chose to study all the aspects of individual differences that he could come up with. He not only pioneered in fingerprinting but worked on individual differences in hearing and smell, invented composite photography to study facial types, studied innate family dispositions to such

talents as art, and fifty years from the time he began these studies he became the father of intelligence testing in the English-speaking world (Fincher, 1976, p. 159).

In the midst of these endeavors Galton began to use certain mathematical techniques that eventually evolved into that branch of genetics called quantitative or population genetics. In 1869, his Hereditary Genius was released. This work was dedicated to his cousin Charles Darwin, and about it Charles said, "I do not think I ever in all my life read anything more interesting or original" (Fincher, 1976, p.160). The book was based on Galton's belief that by studying quantitative characters in populations, a general theory of heredity would emerge (Spiess, 1977, p. 7). To prove this Galton painstakingly traced the genealogies of nearly one thousand British statesmen, professionals and political leaders in diverse activities including rowing and wrestling in an attempt to measure the degree of familial relationship (Fincher, 1976, p. 160).

In this work we see Galton's predisposed position of an aristocrat proclaiming the natural superiority of his status. In the first few pages of Hereditary Genius he makes the following statement:

> It is in the most unqualified manner that I object to pretensions of natural equality. The experience of the nursery, the school, the university and of professional careers, are a claim of proof to the contrary. I acknowledge freely the great power of education and social influences in developing the active powers of the mind, just as I acknowledge the effect of use in developing the muscles of a blacksmith's arm, and no further. Let the blacksmith labour as he will, he will find there are certain feats beyond his power. (Galton, 1972, p. 56)

These words would be echoed throughout the early twentieth century and later they emerged as Jensen's threshold variable of I.Q. Galton used parent-offspring similarity to support this belief. Galton borrowed Quetelet's concept of "average man" and the"normal distribution" and struck off on the path diverse in every way from the ideas of his cousin Charles and Gregor Mendel (Fincher, 1976, p. 161). Galton's scheme came to depend completely on the relationship of statistical means as opposed to the emphasis of Mendel and Darwin on individual variation (Lewontin, 1974, p. 6). Galton describes his method as follows:

> The method employed is based on the law commonly known to mathematicians as that of "frequency of error..." Its application had been extended by Quetelet to the proportions of the human body, on the grounds that the differences, say in stature, between men of the same race might theoretically be treated as if they were Errors made by Nature in her attempt to mould individual men of the same race according to the same ideal pattern. Fantastic as such a notion may appear to be when it is expressed in these terms, without the accompaniment of a full explanation, it can be shown to rest on a perfectly just basis. (Galton, 1972, p. 28)

It need not be dwelt on that this Aristotelean attitude was an act of atavistic heresy in lieu of Darwin's revelations.

The last chapter of Hereditary Genius is called "The Comparative Worth of Different Races" and once again Galton states "I shall make frequent use of the law of deviation from the average." He therefore classifies men according to letters; class A,B...F,G; A being the lower end (Galton, 1972, p. 393).

In comparing the Negro race with the Anglo-Saxon, Galton drew four general conclusions. First, occasionally, but rarely,

has the Negro race produced men of Anglo-Saxon class F; an exception, for example, was Toussaint L'Ouverture. Secondly, the Negro race can produce good factors, although they are generally in our class C or as high as D. In other words, "the average intellectual standard of the Negro is some two grades below our own" (Galton, 1972, p. 394). Thirdly, Negroes in their native country are compared in their relative position with travellers who visit them. "The result is familiar enough--the white traveller almost invariably holds his own in their presence. It is seldom that we hear of a white traveller meeting with a black chief whom he feels to be the better man" (Galton, 1972, p. 394). And last and most damaging to the Negro race:

> Fourthly, the number among the negroes of those whom we should call half-witted men is very large. Every book alluding to negro servants in America is full of instances. I was myself much impressed by this fact during my travels in Africa. The mistakes the negroes made in their own matters were so childish, stupid, and simpleton-like, as frequently to make me ashamed of my own species. (Galton, 1972, p. 395)

It is on the basis of such attitudes that Galton infected mankind with one of the most atrocious scientific/social disciplines of all time--a movement he would some thirty-two years after the publication of Hereditary Genius name "eugenics."

In 1883 Galton published Inquiries into Human Faculty and its Development in which he pioneered in mental testing. In 1884 he established an institution to carry out his work; it was his Anthropometric Laboratory in the South Kensington

Museum. Here he began amassing data on height, weight, breathing power, strength of squeeze and pull, hearing, sight, and reaction time. Through the use of a scattergram, he developed a primitive method of calculating a correlation coefficient to measure the strength of the relationship between parent and offspring characteristics (Biehler, 1976, pp. 89-90). During the six years of the laboratory's existence 9,337 persons passed through Galton's hands (Boring, 1950, p. 487).

With his results from several years of data compilation, Galton published in 1889 his Natural Inheritance. The vehicle for the work was a countless number of parent-offspring correlations. He drew the conclusion that "characteristics of any population that is in harmony with its environments may remain statistically identical during successive generations." He held as proof a concept which remains with us today; that being "regression" toward the population mean. Regression is the idea that parents with phenotypes which deviate greatly from the mean tend to have children with phenotypes closer to the mean. Galton's exact terminology for this was "filial regression" (Spiess, 1977, p. 7).

Galton made another contribution that is still with us. He was the first to realize the potential of using twins to study the effects of heredity versus environment. This has secured for him a place in psychology for all time. He collected data on over eighty pairs of twins and noted that the difference between the correlation of traits of the

identical (monozygotic) twins and the correlation of traits of the fraternal (dizygotic) twins could be used to reveal the influence of heredity on human attributes (Fincher, 1976, p. 166).

Galton lived nearly ninety years and in that span he was a prolific producer of scientific works. He was born the same day as Gregor Mendel, and was as rich as Mendel was poor. He was as celebrated as Mendel was obscure and as urbanely social as Mendel was recluse. He is often dubbed one of the brightest men in history where it is well known that Mendel at first flunked the test for his teaching certificate, scoring lowest in biology. And Galton's eclectic writings were as much in public view as Mendel's remained recondite. Their thinking was nearly antithetical; Galton was concerned with "means" and the "blending" of traits and Mendel with "individual variation" and the permutations involved in the segregation of discrete units (Fincher, 1976, p. 167).

It seems an historical inevitability that the two men produced opposing, often openly clashing, scientific "progeny." During most of the period which has come to be known as the classical period in genetics, extending from the rediscovery of Mendel's work by deVries, Correns, and Tschermak in 1900 until the rise of molecular genetics around 1940 (Ravin, 1965, p. 2), the Mendelian geneticists were constantly opposed by the Galtonians who came to be known as the biometricians. All were concerned with the evolution of mankind, but their

approaches were radically different. The biometricians walked hand in hand with the early mental testers and exerted a powerful influence on socio-political doctrines of the early twentieth century, because like a dim spectre haunting these early demigods of science lay Galton's concept of "eugenics." It is toward this parting of the ways and the consequences of eugenics that we now turn our attention.

The impression should not be given that Galton's views were necessarily predominant during his days of research on human individual differences. In the same year Galton published Hereditary Genius, dedicated to Darwin, Karl Marx also dedicated Das Kapital to Darwin. Marx was interested in changing mankind's evolution, but in a revolutionary way dealing with total environmentalism. But Galton was not without his disciples. During the 1890's Galton acquired a student--a devout believer--Karl Pearson (1857-1936), an ex-economist and mathemetician. Between 1894 and 1899 Pearson revised Galton's statistical methods and published modern methods for dealing with frequency distributions, especially standard deviations, variances, chi-square, and the significance of deviations between expected or theoretical experimental outcomes and the observed outcome (Spiess, 1977, p. 7). Pearson also formalized Galton's idea of correlation. By forming a ratio of the covariance of two measurements and the geometric mean of the variances a correlation coefficient results. Since the numerator is formed by the "product" of two measures, and a variance is the second "moment" about the

mean, this formula has come to us as the Pearson Product Moment Correlation.

Pearson's work with Galton put him in close contact with Galton's concept of eugenics. We can date the beginning of eugenics in its modern form from Galton's Huxley Lecture to the Royal Anthropological Institute in 1901 (Dunn, 1962, p. 296). Galton subsequently became the Director of the Laboratory of National Eugenics at the University of London which became the Galton Laboratory after his death--with Karl Pearson as director (Karp, 1977, p. 50).

As a result of its early formal organization, eugenics got a head start on the field of genetics in the Mendelian tradition. This fact caused a major problem for Western society in the next few decades. First, eugenics predated the rediscovery of Mendel's theory of particulate genetics, and as a result, the early work of eugenics was based on an invalid view of heredity. Secondly, as English geneticist William Bateson emphasized, they had different goals. The matters that eugenics was concerned with had nothing to do with hypothesis testing; rather of greater concern was the problem of the inheritance of "insanity," "feeble-mindedness," and other ill-defined mental ills, and similar goals with immediate social ends (Dunn, 1962, pp. 294-296).

Pearson directly influenced the rift between his biometricians and the Mendelians. In the records of certain discussions on human heredity at the Royal Academy of Medicine he was reported to have claimed that his own view was that there was no truth in Mendelism at all (Dunn, 1962, p. 294).

He later complained that he was misquoted, though two independent records corroborate the statement.

Pearson's teachings were a foreshadowing of the misapplication of human hereditary theory, or more specifically what is termed negative eugenics. He believed that there was in progress an inexorable population decline in physical and intellectual characteristics. To avert such a fate Pearson felt that those with hereditary defects should be discouraged from reproducing. His rejection of Mendelian inheritance and environmental influence on human traits served to exponentially compound the iniquity. He included in his list of genetic diseases such incidentals as tuberculosis, pauperism, and criminality (Karp, 1977, p. 50).

It would be misleading to leave the reader with the impression that the field of eugenics was single-handedly responsible for the spread of non-egalitarianism in the twentieth century western world. For this reason it is appropriate to make a more general statement concerning the zeitgeist of which these events were a part.

In 1949 historian H. Stuart Hughes wrote that "sometime around 1890 the intellectual revolution of our time apparently began" (Wright & Mejia, 1963, p. 2). In An Age of Controversy, Gordan Wright and Arthur Mejia, Jr., attribute the revolution to "two parallel challenges" in the dominant world-view of this period (Wright & Mejia, 1963, p. 2). One challenge they view as external, since it exemplified an attack on scientific rationalism by those outside that realm and who despised every aspect of it. The other challenge was internal, representing

a process of questioning and reconsidering by those within the scientific-rationalistic tradition.

Certain sensitive thinkers such as the Russian writer of oppressive existential works Fedor Dostoevsky and the German philosopher Friedrich Nietzsche had anticipated the external challenge even before 1890. They displayed in their works a passionate distaste for what they considered "the gross materialism, the stiflingly narrow rationalism, the worship of science, the faith in progress that had become the orthodoxy of the age" (Wright & Mejia, 1960, p. 2). Artists and writers preaching art for art's sake and exorting the role of emotions as the key to truth and beauty carried this banner forward. By 1914 there was a large Nietzschean following in most central and western European countries (Wright & Mejia, 1962, p. 2). It was Nietzsche in Thus Spake Zarathustra who called for the breeding of a race of supermen; an idea reflecting a total eugenic approach (Karp, 1977, p. 50).

Like the external challenge, the internal challenge had also been anticipated in the form of a pessimistic determinism confronting the dominant faith in the inevitable progress of science and reason. Men like Herbert Spencer used a distorted Darwinism to cast a view of man as a creature helplessly in the grasp of mighty elemental forces of heredity and not captain of his own fate. This view emerged predominantly in fictional form, notably in the grim novels of Emile Zola (Wright & Mejia, 1963, p. 2).

These challenges alarmed some learned men who were products of the scientistic-rationalistic age, and these men

began to apply the methods of their age toward a more profound understanding of man and society. Their purpose was to restore the orthodox world view to its former state of validity, but their results were unpredictably counterproductive. Men like Sigmund Freud, Ivan Pavlov, and Alfred Binet were psychologists concerned with individual behavior. Others, like Gustave Le Bon, Vilfredo Robert Michaels, and Max Weber, were sociologists wishing to reveal the underlying dynamics of group behavior. The outcome of their efforts has been summed up by Wright and Mejia.

> Whatever their purposes, their discoveries tended to have a common impact: they cast a blinding new light on man's nonrational side, on the tendency of small elites to dominate every sort of social or political group, on the frequent contrast between appearance and reality in human affairs. The net effect was to shake the foundations of some of the nineteenth century's most cherished beliefs. (Wright & Mejia, 1963, p. 3)

Out of the crumbling citadel of nineteenth century rationalism rose a phantasm of antirationalism and antiegalitarianism whose thickening shroud settled neatly and implacably over the movement called eugenics.

The eugenics movement in Europe was hopelessly entangled in the political turmoil of the era, unlike the movement in America which seemed more involved with the early mental testing movement being spread by psychologists. American eugenics was on better terms with Mendelism and more readily accepted the forces in population genetics which reconciled biometrics and Mendelism. The British eugenists correctly assumed that a Mendelian attitude would be the demise of eugenics. In an attempt to avert this fate Pearson as late as 1930 would say

that "during the last 25 years we seem scarcely nearer the exact knowledge of the laws of heredity; the farther we advance the more complex does the problem become" (Dunn, 1962, p. 297). His position had not shifted even though by 1930 the methodology for modern population genetics had been fully developed and included the grounds for a reconciliation of biometrics and Mendelism. A chronological outline of the major forces and events in the development of population genetics methodology is provided in the appendix of this work, and the reader is encouraged to peruse this information for a better understanding of the place of eugenics in relation to sound scientific theory.

The theoretical and methodological crevice separating eugenics and population genetics was described by William Bateson in 1919.

> The eugenist and the geneticist will, I am convinced, work most effectively without organic connection, and though we have much in common, should not be brigaded together. Genetics are not concerned with the betterment of the human race but with a problem in pure physiology, and I am a little afraid that the distinctness of our aims may be obscured. (Dunn, 1962, p. 295)

Bateson lived to see his worst fears of an obfuscation of aims brought to fruition in the reductio ad absurdam of the eugenics movement of the Third Reich.

Eugenics appeared in Germany as Rassenhygiene from a book by that title written by Alfred Ploetz and published in 1895. Ploetz also founded the major German journal in the field, the Archiv fur Rassen-und- Gesellschaftsbiologie. Galton, writing in this journal in 1909, agreed that Eugenik and Rassenhygiene should be regarded synonymously (Dunn, 1962, p. 299).

The goal of Rassenhygiene was anticipated long before Hitler came to power in Germany. Soon after the signing of the Versailles Treaty and German reunification a burst of Nordic pride and sentiments of Aryan supremacy swept the First Reich. The communality of a people forming a single political unit gave rise to the Teutonic myth of a "racial" destiny. The nationalistic pride which followed reunification added an almost mystical reality to the pseudo-scientific theories about Rassenhygiene supplied by men like Ranke, Treitschke, Fritsch, Von Luschan, Schallmayer, von Ehrenfels, Gobineau, Chamberlain and Ploetz (Hillel & Henry, 1975, p. 16).

Soon after reunification Rudolf Virchow undertook a ten year anthropometric study of German schoolchildren obsessed with the goal of tracing the Aryan origin of his compatriots. He was convinced that the outcome of the head measurements, eye color, hair color, and skin tone obtained from ten million children would show a predominance of fair-skinned, blue eyed dolichocephalics. All that emerged was that only the North Germans, a minority of all Germans, could be considered predominantly Nordic (Hillel & Henry, 1975, pp. 17-22). It was results like these that caused Virchow to condemn the indiscriminant use of anthropometry, as discussed in the previous chapter.

In 1900 Dr. William Schallmayer won the Krupp prize given for the best book on the German race. His prize winning title was Inheritance and Selection in the Life of Nations and it espoused "permanent eugenic control of the German population" (Hillel & Henry, 1975, pp. 17-18).

On January 6, 1929, Heinrich Himmler was appointed Reichsfuhrer SS and became the leader of three hundred men who would form the core of the Black Order. Himmler cast aside the Virchow report as inadequate, since the racial and demographic requirements of the future Third Reich were in no way related to the Reich of 1871.

Hans Gunther became the official theorist of the National Socialist Party and party policy revolved around the principle of selection to which the entire nation was subjected. The first step was a determination of just which Germans fit the specifications of an authentic Teuton. These specifications were outlined as follows by Gunther in 1928.

> Tall, long head, narrow face, well-defined chin, narrow nose with very high root, soft fair (golden-blond) hair, receding light (blue or gray) eyes, pink white skin color. (Hillel & Henry, 1975, p. 18)

Therefore, it was under the auspices of a natio-racial destiny that Rassenhygiene was melded into a tightly policed public policy involving the most extreme cases in history of positive and negative eugenics programs, respectively represented in the Lebensborns and the concentration camps.

Rassenhygiene was immediately implemented upon Hitler's ascendency in 1933. In the first few months of this year sterilization laws were adopted and were acclaimed by Ploetz's Archiv. 400,000 sterilizations were carried out in the first years of the Third Reich (Dunn, 1962, p. 299). Jews were immediately legally excluded from the new state, losing all their rights. Frick, Hitler's Minister of the Interior, whose department was charged with administration of laws stated at

their inception: "The fate of race-hygiene of the Third Reich and the German people will in the future be indissolubly bound together" (Dunn, 1963, p. 300).

The committee which drafted the first eugenic laws consisted of German men of science, including Ploetz and his fellow eugenists Rudin and Levy. The amalgamation of science and politics was elucidated clearly by von Verschuer in the introduction of his book Leitfaden der Rassenhygiene published in 1941.

> Decisive for the history of a people is what the political leader recognizes as essential in the results of science and puts into effect. The history of our science is most intimately connected with German history of the most recent past. The leader of the German state is the first statesman who has wrought the results of genetics and race hygiene into a directing principle of public policy. (Dunn, 1963, p. 300)

In this same book von Verschuer credits Galton as the founder of modern eugenics, but he gives Count Gobineau, author of such works as The Moral and Intellectual Diversity of Races, the greater acknowledgement for bringing race into politics, thus founding political anthropology. Galton had never seriously aroused the anthropologists in England, but the German eugenics movement became inseparable from anthropometry. Since anthropometry was never guided by a sound theoretical rationale which may have been provided by population genetics, Rassenhygiene became an easy victim of Aryan mythology. There is no doubt that Rassenhygiene carried anthropology and genetics down with it after the demise of the Nazi state; these sciences were set back a full generation in Germany (Dunn, 1963, p. 300).

Hitler was the prognosticator of Nazi racial programs when he wrote in Mein Kampf:

> The products of human culture, the achievements in art, science and technology with which we are confronted today, are almost exclusively the creative product of the Aryan. That very fact enables us to draw the not unfounded conclusion that he alone was the founder of higher humanity and was thus the very essence of what we mean by the term man. (Hillel & Henry, 1975, p. 15)

It is beyond the scope of this work to discuss the entire racial undertones of the Nazi war effort. Most people old enough to read are aware of Hitler's mass genocide attempts, and names like Auschwitz, Buchenwald and Dachau have become infamous symbols of these attempts. However, it will be helpful before leaving the topic to briefly examine the extent of the positive and negative eugenic attempts.

The genocidal attacks on the Jews by mass gassing was only part of Himmler's broad eugenic program. Of course, this flowed from the Nuremberg laws of 1935 which forbade marriage and sexual relations between Jews and citizens of German blood and deprived Jews of all civil rights, pending a "Final Solution." The Nazi leaders believed in the old idea that mongrelization reduced the quality of a race and wished to prevent contamination of German blood. Furthermore, Jews were not the only victims of the gas chambers (Hillel & Henry, 1975, p. 22). Tens of thousands of Poles, Jewish and otherwise were killed. To accomodate the positive side of their eugenic program, hospitals were stormed and plundered in classic SS style, and the occupants, staff and patients of all ages, were sent to the gas chambers of Auschwitz or Treblinka. Non-transportable patients were shot on the spot (Hillel & Henry, 1975, p. 71).

Of course, other activities occurred in the concentration camps for the purpose of furthering the cause of German understanding of human genetics and racial purity. A brief example is seen in the "scientific" experiments of Dr. Sigmund Rascher, Obersturmbannfuhrer (Lt. Colonel) SS. His studies centered around observing the results of the copulation of Jews under special conditions. He would expose a naked Jew to a naked Jewess at varying periods of time in a special hut. The male was first refrigerated until he lost consciousness and Rascher would observe the difference in behavior if he was exposed to one or more than one woman. Himmler supported Rascher's experimentations until he discovered that the children Rascher's supposedly sterile wife had begun having were stolen and not the results of a miraculous discovery emerging from Rascher's experiments. Rascher was liquidated at Dachua and his wife, Nini, was hanged at Ravensbruck (Hiller & Henry, 1975, pp. 118-119).

The positive eugenics of the Third Reich centered around the Lebensborns. The Lebensborn organization is a less public aspect of the Nazi mystique. Some have heard of them as the human stud-farms created by Himmler. The word Lebensborn is a Nazi neological expression comprised of Leben, "life", and the medieval born,"fount," "spring," or "source"; thus, "fountain of life." They have been depicted in various uses ranging from homes for unwed mothers to brothels at the exclusive disposal of Himmler's SS. At various Lebonsborns during the Nazi regime they may have served both these purposes and others. But the real objective of these institutions was the

mass breeding of a Nordic superrace by men and women meticulously selected and collected in accordance with the racial principles of the Third Reich (Hillel & Henry, 1975, p. 3). They were begun in Germany in the mid 1930's, but were also established in the conquered nations. Financed with the confiscated wealth of Jews and other conquered peoples, they were stringently controlled by the Nazi elite (Hillel & Henry, 1975, p. 40).

A major impetus in the breeding program was the depopulation caused by World War I and the resulting drop in the birth rate in the inflation-racked Weimar Republic (Hillel & Henry, 1975, p. 27). Repopulation overrode any moral or religious restrictions which existed before Nazism. An issue of the SS Leithefte pointed out that,

> having many children is the real meaning of life. That is why a man who has become a father of healthy children is worth more to us than all the deliberately childless priests of a whole millenium. And a German woman who has given life to many children and has looked after them for a lifetime is to us a phenomenon more sacred than all the childless nuns our nation has ever produced. (Hillel & Henry, 1975, p. 42)

Healthy, of course, meant "racially" healthy.

The SS was always intended to play a major role in the propagation of Aryans. Himmler stated that the initial selection of SS troops was so rigidly controlled that until 1936 "we accepted no one who had even a filled tooth. The men we assembled in that early Waffen SS were the most magnificent specimens of manhood" (Hillel & Henry, 1975, p. 19). The Lebensborns housed wives, fiancees and girlfriends of these chosen specimens.

Women were encouraged to reproduce as many children as possible. A return to the hearth was propagandized liberally (Hillel & Henry, 1975, p. 28). Homosexuality was totally condemned. Himmler had his own nephew SS Obersturnfuhrer Hans Himmler liquidated at Dachau for homosexuality (Hillel & Henry, 1975, p. 32). The highest hopes of the regime were for the secret Lebensborns. Himmler's ambition was to populate Germany with 120 million Teutons by 1980 (Hillel & Henry, 1975, p. 52). Children of the "proper" race were kidnapped by the SS from all over Europe to be Germanized. Over 200,000 were kidnapped in Poland alone (Hillel & Henry, 1975, p. 4). Mistakes produced by the breeding programs were allowed to die or were killed and the bodies, particularly Nordic ones, were dissected to conduct "scientific research" into grave hereditary and constitutional illnesses (Hillel & Henry, 1975, p. 116).

What should we have learned from Germany's Rassenhygiene?

> From this melancholy historical lesson can be drawn that the social and political misuse, to which genetics applied to man is peculiarly subject, is influenced not only by those who fail to point out, as teachers, the distinctions between true and false science. (Dunn, 1963, p. 300)

Eugenics movements grew in other countries during the early twentieth century, fortunately in a less extreme fashion than Germany's. In Russia, ironically, eugenics did not appear in an organized form until after the Bolshevic Revolution of 1917. In 1919 the Institute of Experimental Biology in Moscow started a eugenics department under N.K. Koltzoff, and soon after a Eugenics Bureau was established in the Leningrad area under J.A. Philiptschenko. In 1920 the Russian Eugenics Society was founded in Moscow, with branches in Leningrad, Saratov and

Odessa. In 1923 the Russian Journal of Eugenics began publication under Koltzkoff and Philiptschenko. However, party policy changes in the Soviet Union eventually led to a suppression of eugenics (Dunn, 1963, p. 302).

The eugenics movement in the United States was a descendent of the movement in Britain, although as has been mentioned, the attitude toward Mendelism differed. The groundwork for eugenics had been laid by researchers like Alexander Graham Bell with his studies of deaf-mutism in 1883. One of the most active early eugenists in the U.S. was Charles B. Davenport, a Mendelian. He was bitterly opposed by the British biometricians in his Mendelian approach to mental defects. Davenport and others were guilty of a misapplication of Mendelism which would ultimately damage eugenics in the U.S. Davenport and others maintained a single gene interpretation which viewed differences in mental ability and mental defects such as feeble-mindedness as a single recessive gene (Dunn, 1963, pp. 298-299). The discussion of the eugenics program in the U.S. during this period will be discussed in the next chapter, because eugenics in the U.S. bridged the gap between genetics and psychological testing. It is in the framework of the early mental testing movement that the story of the early history of eugenics in the U.S. can be concluded.

CHAPTER V
A VIEW FROM PSYCHOLOGY: THE MENTAL TESTING MOVEMENT IN AMERICA

We learned from the forbidden fruit
For brains there is no substitute
"Unless it's sweetbreads," you suggest
With innuendo I detest.
You drive me to confess in ink,
Once I was fool enough to think
That brains and sweetbreads were the same,
Till I was caught and put to shame,
First by a butcher, then a cook,
Then by a scientific book.
But 'twas by making sweetbreads do'
I passed with such a high I.Q.

Robert Frost

And if a stranger sojourn with thee in your land, ye shall not do him wrong. The stranger that dwelleth with you shall be unto you as one born among you, and thou shalt love him as thyself.

Leviticus 19:33

In the United States, attitudes congenial to a eugenics movement arrived on the tailwind of Social Darwinism which had already enjoyed considerable popularity for two decades. In the previous chapter we saw that geneticists such as C.B. Davenport attributed intellectual potency to a single gene pair interpretation and genetic deficiencies such as feeble-mindedness to a single gene recessive. This interpretation was to have socio-political ramifications in the United States which rivaled any movement in history in terms of the injustices wrought on large segments of the world's ethnic

populations. However, unlike the European movement in this country, eugenics as a social policy was given scientific impetus through an exaggerated optimism regarding the new methods of mental testing. Along with worldwide political circumstances in the late nineteenth and early twentieth centuries, eugenics and mental testing combined in an atmosphere primed for relegation of those groups "proven" to be inferior peoples to their "natural" positions.

J.R. Pole views the American eugenics movement in the form of a specific program as a fad doomed to failure but with devastating aftereffects:

> As a specific programme, eugenics had no prospect of success, but as the basis for a popularised notion of white and Nordic superiority its effects multiplied long after the more scientific bases for racial selectivity had begun to crumble. (Pole, 1978, p. 232)

In order to see how these events unfolded in the United States it will be helpful to first briefly explore the early beginnings of mental testing as a psychological discipline.

Although political and social circumstances in America and Europe were different during the late nineteenth and early twentieth centuries, the growing science of psychology in America was closely tied to European psychology. In a letter to his mentor, Gaston Paris, Alfred Binet (1857-1911) included comments which reflected the American attitude toward European psychology. He wrote that "the American students are not satisfied with diplomas given at these [American] laboratories, and so they come to the laboratories of Old Europe, seeking a title that has more prestige than theirs. For a long time they

had gone to Germany, particularly to Wundt's laboratory at Leipzig" (Wolf, 1973, p. 13). Two of these American students who received training at Leipzig became celebrated influences in American psychology and both contributed to the development of mental testing. These men were James McKeen Cattell (1860-1944) and Granville Stanley Hall (1844-1924). G. Stanley Hall's influence on the development of mental testing is indirect, since it was played out through his students. Hall's own method of data gathering was based on the questionnaire. However, some of his students made major contributions to the mental testing movement and to the application of testing to ethnic groups (Ross, 1972, pp. 352-353). Because Hall's influence was reflected in his students, his impact was actually felt after Cattell's. In fact, for one semester before he returned to Leipzig in 1883, Cattell was himself a student of Hall's at Johns Hopkins University (Boring, 1950, p. 533).

In the previous chapter, the discussion of Galton's work acknowledged his contributions to rudimentary mental testing at the South Kensington Museum in the 1880's, and in actuality the 1880's was dominated by Galton in this area. However, the 1890's belonged to Cattell though he wasn't the sole contributor. Joseph Jastrow (1863-1944) demonstrated a set of fifteen tests at the Columbian Exposition at Chicago in 1893, Hugo Munsterberg (1863-1916), an ex-student of Wundt's who moved to America, had designed fourteen tests for school children by 1891. But as an individual researcher, Cattell was far more important in this budding field than the others in this decade (Boring, 1850, p. 511).

Cattell was a dedicated student of Wundt's and he chose to remain within the framework of traditional experimental psychology for his testing efforts. He was fired from Columbia for his allegedly treasonous opinions concerning the first world war. While still working in Wundt's laboratory he had become interested in reaction time, a structural variable which many still believe correlates positively with intelligence. In 1885, he published data gathered at Leipzig in an article entitled "The Influence of the Intensity of the Stimulus on the Length of the Reaction Time." Here he describes the length of time it takes a subject to lift his hand after the appearance of a light. He also differentiates between reaction time and will time by having subjects respond only to a certain color light (Cattell, J.M., 1885, pp. 323-325). In 1886, he published an article entitled "The Time It Takes to See And Name Objects," in which he asserts the relations between perceptual reaction time (will time) and association of ideas as a blow against Kant's accusation that psychology can never be an exact science (Cattell, J.M., 1886, pp. 326-328). In 1887, he published "Experiments on the Association of Ideas," a type of research begun by Galton during his walks in London. Cattell says here that Wundt was much impressed with Galton's work in this area and this justified bringing association as an experimental variable into the laboratory. In these studies Cattell became involved in other mental processes such as "recollection-time," concept formation, simple memory and free association (Cattell, J.M., 1887, pp. 68-74).

These experiments lead Cattell into the study of individual differences in mental processes and in 1890 he began his attempts at precise psychological measurement. In 1890, he coined the term "mental test" in the title of an article, "Mental Tests and Measurements." In the opening sentences of this article Cattell reflects the future hope of mental testers; a hope we shall see backfire in the faces of some early mental testers at the expense of the innocent. Cattell opens thusly:

> Psychology cannot attain the certainty and exactness of the physical sciences, unless it rests on a foundation of experiment and measurement. A step in this direction could be made by applying a series of mental tests and measurements to a large number of individuals. (Cattell, J.M., 1890, p. 347)

A few decades later, testers, believing they had already developed such an exact science, let their optimism get dangerously out of hand.

In the 1890 article Cattell proposes a set of ten tests. The tests include both anthropometric and structural variables of Wundt's original system, foreshadowing his ultimate failure where others were to succeed. The tests are as follows: 1) dynamometer pressure--to measure the squeeze of the hand; 2) rate of movement--the fastest possible movement of the right hand and arm from a resting position through 50 cm; 3) sensation areas--the distance on the skin by which two points must be separated to be felt distinctly as two; 4) pressure causing pain; 5) least noticeable difference in weight; 6) reaction time for sound; 7) time for naming colors; 8) bisection of a 50 cm line; 9) judgement of 10 second time;

10) number of letters repeated on once hearing (Cattell, J.M., 1890, pp. 348-351).

It is obvious that these are not items which we would expect to see on a contemporary mental test. These were designed to measure such Wundtian concepts as accommodation, intensity and extensity.

Although mental testing could not advance beyond Cattell until it was carried beyond this tradition, Cattell's statistical methods; i.e. the use of correlation coefficients, have remained. This change in emphasis is where Hall's legacy becomes important. As Dorothy Ross states in her biography of Hall:

> He supplied his students with the stimulus to put psychology to work in educational and medical settings, to join insights from a variety of different fields in novel combinations, and to attack directly the larger, functional units of behavior. In this environment, talented students could break out of the atomistic categories of traditional experimental psychology in which Cattell's testing efforts were trapped, though they could not acquire the necessary statistical competence which Cattell and others supplied for the movement. (Ross, 1972, pp. 353-354)

The combined impact of Cattell and Hall shifted mental testing to its modern form.

Cattell had also carried out studies reminiscent of Galton's work. For example, his American Men of Science was a replica of Galton's British lineage studies, though he is not as dogmatic in his interpretation of data.

Cattell also left a student behind who would become as E.G. Boring says, "America's most distingquished leader in the

field of the mental tests" (Boring, 1950, p. 540). This distinguished leader was Edward Lee Thorndike (1874-1949) who would join the American eugenic movement along with some of Hall's academic offspring.

G. Stanley Hall was a central figure in the early days of developmental studies. His recapitulation theory is still taught in developmental psychology classes. (Its central characteristic is the idea that "ontogeny recapitulates phylogeny," or that we can see in the development of a human being from conception onward the same phases that man went through during the course of evolution) (Biehler, 1976, p. 93). Hall, then, was a staunch evolutionist, but with an emphasis on an hereditarianism which formed the basis of his eugenic psychology. His child study program centered on physical development as the prerequisite for mental development, and he often stated that "an ounce of health, growth and heredity is worth a ton of education" (Ross, 1972, p. 293).

Hall's hereditarian tendencies carried over to his social attitudes, and he saw the maintenance of healthy biological evolution of the human race as the most important role of psychology. The role of education and science was for cultural progress as a leading indicator of improvements in the racial stock and for the ultimate breeding of the superman. He held a moderate stance on eugenics, since he was an old fashioned believer in the Lamarckian tradition of inheritance of acquired characteristics. Therefore, to him eugenics was not the only approach to racial improvement. Although he could never accept

the more extreme forms of eugenics, as did some of his students, he did favor sex education to promote eugenic marriages, and he anticipated his students' fear of the dangers to mankind of feeble-mindedness (Ross, 1972, pp. 412-413).

Hall also upheld a traditional naivete regarding racial distinction. He regarded Negroes, Jews, southern Europeans, and Anglo-Saxons as separate races and feared that the declining birth rate of the Anglo-Saxons was a form of racial suicide. He felt that primitive peoples were in the early stages of racial evolution and was apprehensive of the fact that any one of them could take a turn in development and win the race of civilizations in attaining superman status (Ross, 1972, pp. 412-413).

Even with his atavistic way of viewing racial and cultural evolution, Hall persistently espoused individualism over uniformity as the final goal of racial and educational policy (Ross, 1972, pp. 412-413)--a point some of his students seem to have missed. Dorothy Ross again provides an accurate description of Hall's influence.

> Hall's hereditarian imprint, reinforcing the work of Francis Galton and the evolutionism of the day, remained with Goddard, Terman, and through Thorndike as well, much of the subsequent intelligence testing effort. (Ross, 1972, p. 354)

Before continuing with the works of Hall's students, Henry H. Goddard (1866-1957), and Lewis Terman (1877-1956) as well as the activities of Thorndike, it is necessary to first look at some other researchers who influenced these Americans.

Alfred Binet's name has become synonymous with mental testing, a fact with a sardonic twist when one considers that the disciples who promoted it in America seem to have misinterpreted what it represented. Some very harsh social injustices transpired partially as a result of American psychologists like Goddard and Thorndike who "failed to appreciate, perhaps even to understand, the real bases for Binet's psychological methods and thought (Wolf, 1973, p. 218). Certainly Binet's research on intelligence led him to "the first pale glimmer of an idea that was to transform the Western World"(Fincher, 1976, p. 169) although it is doubtful that he would have been pleased with the macabre transmutation which took place following the American translation of his idea.

The time between 1904 and 1911 (the year of his death) was Binet's productive period in mental testing research, and they highlighted his otherwise unsuccessful years at his Laboratory of Physiological Psychology within the School for Advanced Studies at the Sorbonne in Paris (Wolf, 1973, p. 12). In October of 1904 the Minister of Public Instruction solicited Binet's aid in "the study of measures to be taken for insuring the benefits of instruction to defective children" (Binet & Simon, 1948, p. 407). Binet and the commission with which he was working came to the immediate conclusion that,

> no child suspected of retardation should be eliminated from the ordinary school and admitted into a special class, without first being subjected to a pedagogical and medical examination from which it could be certified that because of the state of his intelligence, he was unable to profit, in an average measure, from the instruction given in the ordinary schools. (Binet & Simon, 1948, p. 407)

The commission readily made this a policy but they were willing to go no further, and it fell upon Binet and his coworker Theophile Simon to continue beyond this administrative level into the scientific questions of "how the examination of each child should be made, what methods should be followed, what observations taken, what questions asked, what tests devised, how the child should be compared with normal children" (Binet & Simon, 1948, p. 407). Binet, like others before him, had little to go on. The only leads he had were the mistakes he felt others had made. He intuitively grasped the fact that researchers like Galton were entering blind alleys by correlating structural variables such as sensory acuity with success in Western society (Ehrlich & Feldman, 1977, p. 50). Binet took a functionalist approach to the problem which reflects his open ended view of psychology as a synthesis of disciplines such as ethics, pedagogy, and philosophy--a view which owed a debt to American functionalists such as John Dewey. In 1909 Binet wrote,

> We predict a new method for measuring the phenomena of consciousness; instead of measuring their intensity, which has been the vain and foolish ambition of the psychophysicists, we shall measure the useful effects of acts of adaptation, and the value of the difficulties overcome by them; there is here a measure that is not arithmetical, but one that permits a lineal seriation, a hierarchy of acts and of different individuals judged according to their effectiveness. (Wolf, 1973, pp. 203-204)

In this prognostication of Binet's we can see some of the implications and misinterpretations which Binet's work has suffered. For example, we can see the influence of Binet's

functionalism on the young Jean Piaget who worked at the Binet Laboratory at the age of twenty-one. Although Piaget was more interested in the wrong answers children gave to the mental tests (Biehler, 1976, p. 154), the idea of a lineal hierarchy of adaptive acts, non-arithmetic in nature, obviously appealed to him, as we can see in his stage theory of cognitive development. Furthermore, for Binet, this concept of mental hierarchy reflects the purpose of the mental tests in determining the mental level of students. Contrary to many theorists' beliefs Binet's concept of mental level is not equivalent to mental age. When Binet began to observe the adaptive behavior of his own daughters, Madeleine and Alice, he noticed that their age difference was a determining factor in their problem solving abilities, but he was hesitant to call the average levels of children mental age since it "would imply a rather ordered, probably genetic developmental progression that he had not demonstrated" (Wolf, 1973, p. 202). It appears that Binet's phrase niveau mental has often been interpreted as mental age and along with it the idea of the mental processes as an "endogenous and ordered dynamism" (Wolf, 1973, p. 202), which according to Binet, had not been verified. Mental level, on the other hand, was more noncommittal than age, and therefore precluded unconfirmed genetic prescriptions about mental development. Binet's reservations, however, did not deter Wilhelm Stern, the ex-student of Ebbinghaus from establishing in 1911 the renowned concept of the intelligence quotient (I.Q.) by forming the ratio of

chronological age to mental age times 100 (M.A./C.A. x 100) (Wolf, 1973, pp. 202-203). This not only defied Binet's apprehensions about using the term mental age but set a lasting precedence of the faith in an arithmetical measure of intelligence.

In 1905 Binet and Simon published the results of their researches as the first practically significant intelligence scale. The scale of norms which Binet and Simon developed from 1905-1908 to accompany the test was used as a "mental age" scale (Boring, 1950, p. 574) in America with all its genetic implications.

It had been Binet's hope that the scale could be successfully utilized to determine more accurately the correct categories for subnormals. These categorical definitions had already been named by the alienists of the day (those concerned with the legal aspects of psychiatry) as "idiot" for the lowest level, "imbecile" for the intermediate, and "moron" for the state closest to normality (Binet & Simon, 1948, p. 408). These categories remained in use after Binet's death.

Even with his reservations about mental age, Binet felt that his first test measured a fundamental faculty which was natural and not the result of instruction. His justification was that "we give him [the child] nothing to read, nothing to write, and submit him to no test in which he might succeed by means of rote learning...it is simply the level of his natural intelligence that is taken into account" (Binet & Simon, 1948, p. 416). This is reflected in the original test items which

range from such activities as showing the eyes, nose, and mouth or giving last name for the three year old to paper cutting and giving differences of meaning for a thirteen year old (Binet & Simon, 1948, pp. 420-421). Yet as his work progressed in subsequent years, Binet's attitude softened to the more functional aspects of adaptation rather than faith in a faculty of intelligence.

Throughout his career Binet felt no basis in evidence for arriving at a conclusive definition of intelligence. The emphasis in the first scale was on the fundamental faculty of judgement, but this changed to "adjustment to the environment" for the revised scale he was working on at the time of his death (Wolf, 1973, p. 209).

Binet's contributions officially launched the science of mental testing. Given the subsequent events which unfolded with indefatigable asperity it becomes apparent why E.G. Boring says, "Binet died in 1911 at the age of fifty-four. It might have been useful to have had him live a little longer" (Boring, 1950, p. 573), and, from a different perspective, why Leon Kamin says, "it is perhaps as well that Binet died in 1911, before witnessing the uses to which his test was speedily put in the United States" (Kamin, 1974, p. 5).

Binet's reluctance to formulate a definition of intelligence left a vacuum which others were not hesitant to fill. During Binet's productive period in France, across the channel in England, Francis Galton had induced the British Association for the Advancement of Science to finance an effort to determine the mental capacity of British schoolchildren. A commission

was formed to execute this survey and included among its members were Charles Spearman (1863-1945), a former British officer in the Boer War, and Cyril Burt (1886-1971), who has been called "the most brilliant social engineer of the early twentieth century" (Fincher, 1976, p. 171). Burt and Spearman willingly attacked the ambiguous abstraction which Binet and others had avoided: the structure of intelligence. They agreed on a "kind of superfaculty" (Fincher, 1976, p. 171), Burt would later write. More importantly, Spearman also deduced the statistically sophisticated concept of factor analysis, which is a method of deriving a hierarchy of correlations from a set of tests. Factor analysis came "to constitute the conceptual basis for Binet's test approach" (Wolf, 1973, p. 216).

In 1904, Spearman put forth a two factor theory of intelligence from observations and deductions that were "purely mathematical" (Spearman, 1937, p. 218). He arrived at a "monarchic" interpretation of a "general intelligence" as opposed to the "oligarchic" view stemming from a faith in "faculties" or "types" and the "anarchic" theory based on the belief in an infinitely great number of independent elements such as sensations and associations that, for example, the Herbartian school of thought recommended (Spearman, 1937, p. 218).

Spearman's interpretation was based on a "momentous observation." When a group of mental tests which are "sufficiently dissimilar" (and only in this case) are administered to a number of persons, the intercorrelations of the tests

arrange themselves in a "peculiar orderly system" called a hierarchy (Spearman, 1937, p. 219). Spearman gives the following "example of ideal perfection" in which the letters a,b,c,d stand for sufficiently dissimilar tests and the decimal numbers are the correlation coefficients among the tests, (a correlation coefficient being a number between the perfect inverse or negative correlation of -1 and the perfect analogous or positive correlation of +1).

	a	b	c	d
a		.9	.6	.3
b	.9		.4	.2
c	.6	.4		.1
d	.3	.2	.1	

This matrix of coefficients displays a systematic reduction in positive value from left to right and from top to bottom (Spearman, 1937, p. 219).

When the hierarchy criterion has been satisfied, Spearman deduced that each test score could be divided into two independent factors, one a general factor (Spearman's g factor) and the other a specific (s) factor. Spearman felt that this was the most "parsimonious" of the explanations for intelligence as long as the tests were sufficiently dissimilar; otherwise, the s's are not orthogonal (independent) and become distorted by covariance (overlap) (Spearman, 1937, pp. 220-221).

Spearman added one more major aspect of g and that is its "uniqueness" (Spearman, 1937, p. 222). Without uniqueness the value of g could fluctuate for any individual and perhaps

cause him to be placed at different times in a wide range of intellects ranging from moron to genius, Spearman's strongest defence of g's uniqueness was that as we approach the "true" measurement of an individual's intelligence, all possible values for g converge on one point. Since in mental testing theory the "true" measurement is the final limiting value of reliability and validity, "g only follows the lead of all scientific measurements whatsoever" (Spearman, 1937, pp, 222-223). Thus, the quality of the definition of general intelligence is dependent on the underlying reliability and validity assessment of the standardization procedure, independent of any theoretical implications of a nonstatistical nature. Thus, Spearman could brag that g, unlike the word "intelligence" is not so loosely defined that it "wanders so hopelessly from one meaning to another as finally to forfeit all meaning" (Spearman, 1937, p. 224).

Given the mathematical nature of Spearman's definition, it is not surprising that Binet was highly critical of such conclusions. About Spearman's belief in the profound implications of g, Binet said, "we ourselves are profoundly astonished at this because of the very defective character we find both in the sensory experiments of the author [Spearman], and also in his method of estimating...the total intelligence (Wolf, 1973, p. 208). Nevertheless, Spearman's g became widely accepted as the operational definition of intelligence after Binet's death.

The American proponents of Binet's test of intelligence held an optimism about the test's ability to assess innate

intelligence that was like gasoline on the fire of their pessimistic sociopolitical views. Their belief in the hereditary fixation of intelligence stemmed from the views of geneticists like Davenport who asserted a single Mendelian recessive as the cause of mental defectiveness. The chief concern was over the mental condition known as "feeble-mindedness," and it was with an unrestrained dogmatism that Binet's test was employed to diagnose this condition (Dunn, 1962, p. 299).

As is generally the case, the mental testers did not invent a racially biased discipline out of their own particular disdain for one or more ethnic groups. Rather, they fell victim to the sociopolitical and scientific Weltanshauung of the era that Stanley P. Davies in 1923 dubbed "the alarmist period" (Dunn, 1962, p. 299).

According to popular view, until the 1890's differences in race were attributed to differences only in color. Americans were familiar only with American Indians, Orientals, and Negroes, and these races were particular to certain geographic areas (Pole, 1978, p. 223). The American Indians lay heavily on the American conscience but were dealt with locally. But as early as 1875 qualitative restrictions were placed on the influx of the "coolie" (k'u-li: Chinese for indentured servant) along with convicts and prostitutes. In 1854, Humphrey Marshall, our Commissioner to China in 1853-54 had warned of "the national horror at the curse with which the prospective inundation of oriental barbarism threatens our country" (Curran, 1975, p. 80). This reflects a xenophobic attitude which cul-

minated in the congressional Exclusion Act of 1882. The Supreme Court upheld such exclusion in the Chinese Exclusion Case of 1889 which maintained the right of Congress to exclude "foreigners of a different race who will not assimilate with us" (Carliner, 1977, p. 13). The Supreme Court again condoned inequalities of right when defined by race in Fong Yue Ting v. United States in 1893 and in Plessy v. Ferguson in 1896 (Pole, 1978, p. 222). Since the nation's most authoritative legal body was endorsing such policies, it was easy for the public to exxagerate these opinions.

Immigration took an altered form after the breakdown of the Bismarckian system in Europe after 1890. In the 1880's most Americans were unable to distinguish one immigrant group from another, but with the "new immigration," which had firmly established its presence statistically by 1899, groups could easily be identified by distinctions of appearance, language, and custom. American perceptions of these ethnically distinguishable groups yielded more to rumor than to fact (Pole, 1978, p. 223). The majority of the new wave was not coming from the north and west of Europe as it had in the past, but rather from the south and east of Europe where, in areas like the Russian European provinces, the Balkans, Italy, and Sicily, political disparities were being ever increased as the "balance of power" in Europe was undergoing major shifts (Lafore, 1965, p. 40).

The situation was antagonized by the psychological impact wrought by the formal information that America no longer had

unlimited boundaries and that the "open" frontier was now closed. These pessimistic adumbrations struck Americans in the most sensitive area with the sudden panic of 1893 and the following depression (Pole, 1978, p. 226). The faith in the ability of the American economy to absorb the tide of immigrant labor into the work force dissipated in a wave of xenophobia.

Out of these xenophobic apprehensions flowed an expanding list of types to be excluded from admission to the United States. The 1882 act excluded lunatics and idiots, and in 1903 epileptics and insane persons were added. By 1907 quantitative distinctions were being drawn between imbeciles and the feeble-minded, and both groups were excluded. The public clamor for quality control was taking its toll (Kamin, 1974, pp. 15-16).

It was into this atmosphere that the immigrants from southern and eastern Europe sailed in the late 1890's and early 1900's. By 1912 they had been passing into New York Harbor by the millions. They sailed past Liberty Island where the "woman with a torch" stood bearing the following inscription by Emma Lazarus:

> Not like the brazen giant of Greek fame,
> With conquering limbs astride from land to land,
> Here at our sea washed, sunset gates shall stand
> A mighty woman with a torch, whose flame
> Is the imprisoned lightning and her name,
> Mother of Exile. From her beacon hand
> Glows world wide welcome;
> Her mild eyes command the air bridged harbor
> That twin cities frame.

> "Keep ancient land your storied pomp!" she cries,
> With silent lips. "Give me your tired, your poor,
> "Your huddled masses, yearning to breathe free,
> "The wretched refuse of your teeming shore.
> "Send these, the homeless, the tempest-tossed to me;
> "I lift my lamp beside the golden door."
> (Campbell, 1954, prologue)

Once ashore the new immigrants would discover that the sentiments expressed by these words held no promise of relief and for many it may have seemed that Emma Lazarus' poem had been engraved on the statue as a maleficent joke. In 1873, when there were only 12,703 immigrants from southern and eastern Europe living in the United States, Francis A. Walker, the Superintendent of the Census, was writing in favor of open immigration as a means to counter a declining birthrate. Twenty years later immigrants from these areas were pouring in at the rate of more than half a million a year, and Walker's opinion of the typical immigrant had changed from viewing him as "the most enterprising, thrifty, alert, adventurous, and courageous of the community from which he came" (Petersen & Matza, 1963, p. 199) to

> the least thrifty and prosperous...(from) every foul and stagnant pool of population in Europe, which no breath of intellectual or industrial life has stirred for ages. (Petersen & Marza, 1963, p. 200)

For Walker, as for much of the American public, the problem was how to protect "the quality of American citizenship from degradation through tumultuous access of vast throngs of ignorant and brutalized peasantry from the countries of eastern and southern Europe" (Petersen & Matza, 1963, p. 200).

What was needed was a scientific method of curbing the flow which, if unchecked, would make America, in Frederick

Jackson Turner's words, "a great reservoir for the pipe lines that run to the misery pools of Europe" (Petersen & Matza, 1963, p. 201). At first a literacy test was proposed, but it wasn't long before the science of mental testing was called upon to render good its proclaimed ability to measure innate intelligence (Kamin, 1974, p. 16).

In 1912 Henry H. Goddard was invited by the United States Public Health Service to the immigrant receiving station on Ellis Island in New York Harbor for the purpose of administering intelligence tests to arriving immigrants. The results were less than hopeful. Of all the immigrants tested, 83% of the Jews, 80% of the Hungarians, 79% of the Italians, and 87% of the Russians were shown to be feeble-minded. Professor Kamin reports Goddard's claim that "the number of aliens deported because of feeble-mindedness... increased approximately 350 percent in 1913 and 570 percent in 1914" (Kamin, 1974, p. 16).

Goddard's effect on the immigrants epitomizes the sociopolitical ramifications of the nature-nurture controversy. He had betrayed the original intent of Binet by substituting "for Binet's idea of intelligence as a shifting complex of interrelated functions, the concept of a single underlying function (faculty) of intelligence" (Wolf, 1973, p. 216). and the results became a human tragedy in the years to come.

In the year that Goddard was administering tests at Ellis Island, the Macmillan Company published the results of a six year study he began in 1906 as research director of the

Vineland, New Jersey School for the Feeble-Minded. It was as Goddard believed, "a problem of true heredity" (Goddard, 1912, p. 51) involving the Kallikak family (a pseudonym from the Greek for good-bad) (Fincher, 1976, p. 175). Martin Kallikak Sr., a Revolutionary War militiaman had sired two family lines, one with a girl of good breeding, the other with a feeble-minded girl. Goddard traced these two lines for six generations and found a respectable lineage descended from the good side and a preponderance of mental defectives on the bad side. He felt their environments were similar enough to warrant a purely hereditary interpretation and viewed the career of Martin Kallikak Sr. as "a powerful sermon against sowing wild oats" (Goddard, 1912, p. 103) and he cautioned "our young men of good family that they dare not step aside for even a moment" (Goddard, 1912, p. 102).

From the sad tale of the Kallikak family, Goddard justified some widesweeping social policy recommendations for handling the feeble-minded. Goddard's plan was simple; "segregation through colonization seems in the present state of our knowledge to be the ideal and perfectly satisfactory method. Sterilization may be accepted as a makeshift, as a help to solve this problem because the conditions have become so intolerable" (Goddard, 1912, p. 117). Only by ostracizing these hereditary defects could we rid society of "paupers, criminals, prostitutes, drunkards, and examples of all forms of social pest with which modern society is burdened" (Goddard, 1912, p. 116). Goddard's intent for the role of the mental

test is obvious since "feeble-mindedness is largely responsible for these social sores" (Goddard, 1912, p. 116).

With the science of mental testing being put to such politically important uses it was not long before the Eugenic Research Association paid its due respect. Biologist Harry Laughlin, editor of the Eugenical News, wrote in 1917:

> Recently the science of psychology has developed to a high state of precision that branch devoted to the testing of individuals for natural excellence in mental and temperamental qualities. When the knowledge of the existence of this science becomes generally known in Congress, that body will then be expected to apply the direct and logical test for the qualities which we seek to measure. (Kamin, 1974, p. 16)

That psychologists using mental tests were receiving such glorious recommendations from the American Eugenics movement in 1917 was not surprising. As early as 1905 Edward L. Thorndike published an article called the "Measurement of Twins" which was to set a precedent for future research that would please any eugenicist. In this article, originally published in the Journal of Philosophy, Psychology and Scientific Method, Thorndike outlines a study which, for the first time ever, combined the "new techniques" of correlation and mental tests to the problem of twin resemblance (Thorndike, 1948, p. 399). Thorndike found that the correlation between twins on mental test scores was significantly greater than that of ordinary siblings. This led him to the following conclusion:

> Thus the prizes which most men really seek are, after all, in large measure given or withheld by original nature. In the actual race of life, which is not to get ahead, but to get ahead of somebody, the chief determining factor is heredity. (Thorndike, 1948, p. 406)

The sentiments of Thorndike as well as his methods are still echoing through recent history. Thorndike was to later play a role in the politics of eugenics.

Another prominent figure in American psychology played a major role in the development of mental testing. This was Lewis Terman. "In 1914 he developed the Army Alpha test, a milestone in psychometry" (Fincher, 1976, p. 176), which was called into action during World War I as a means of placing Army personnel in their proper niche. In 1916 Terman published The Measurement of Intelligence: An Explanation of and a Complete Guide for the use of the Stanford Revision and Extension of the Binet-Simon Intelligence Scale. Terman's scale has come to us as the familiar Stanford-Binet, since Terman conducted his study at Stanford University. Terman dedicated his revision "To the memory of Alfred Binet, patient researcher, creative thinker, unpretentious scholar, inspiring and fruitful devotee of inductive and dynamic psychology" (Terman, 1916, dedication page). Given Terman's divergence from Binet's intended path for mental testing, this dedication becomes another of history's little ironies.

The Stanford-Binet test was the first attempt to accurately standardize a mental test in order to obtain an accurate distribution of intelligence in the population. To accomplish this "the guiding principle was to secure an arrangement of the tests and a standard of scoring which would cause the median mental age of the unselected children of each age group to coincide with the median chronolgical age" (Terman, 1948,

p. 486), Terman tested 1000 unselected (randomly selected) children, and, by trial and error, gave large numbers of test batteries to the children coming up with 36 new tests through a process of elimination. The result was a frequency distribution of combined ages that was "remarkably symmetrical" (Terman, 1948, p. 489); the famous bell shaped or Gaussian curve for intelligence was thus established. The curve placed 33.9% of the population in the average group of I.Q.'s ranging from 96-105. The frequency then descended on either side of average as subjects deviated above and below normality.

There is no doubt that Terman was convinced of the test's ability to make measurements of intelligence with the unerring accuracy of any overtly physical measurement, and the intelligence test had the inherent added attraction of allowing psychologists to set their own standards for intelligence. He says that,

> the number of mentally defective individuals in a population will depend upon the standard arbitrarily set up as to what constitutes mental deficiency. Similarly for genius. It is exactly as if we should undertake to classify all people into the three groups: abnormally tall, normally tall, and abnormally short. (Terman, 1948, p. 489)

Ultimately hundreds of thousands of southern and eastern Europeans were to pay the maximum penalty for being arbitrarily classified as "abnormally short" on intelligence.

Terman had lofty hopes for the social functions of his test. For one thing, intelligence tests would be a fundamental tool in making society a safer, more productive place in which to live.

> It is safe to predict that in the near future intelligence tests will bring tens of thousands of these high-grade defectives under the surveillance and protection of society. This will ultimately result in curtailing the reproduction of feeble-mindedness and in the elimination of an enormous amount of crime, pauperism, and industrial inefficiency. It is hardly necessary to emphasize that the high-grade cases, of the type now so frequently overlooked, are precisely the ones whose guardianship it is most important for the State to assume. (Terman, 1916, pp. 6-7)

This prognostication was coupled with another that explains Harry Laughlin's and other eugenicists' faith in the future of mental testing for their own socio-political purposes. Terman further predicted that "there will be discovered enormously significant racial differences in general intelligence, differences which cannot be wiped out by any scheme of mental culture" (Kamin, 1974, p. 6).

Terman lived to see these prophecies fulfilled far beyond his wildest hopes in the American system. Recommendations for educational policies flowed freely from his faith in the test.

> We are beginning to realize that the school must take into account, more seriously than it has yet done, the existence and significance of these differences in endowment. Instead of wasting energy in the vain attempt to hold mentally slow and defective children up to a level of progress which is normal to the average child, it will be wiser to take account of the inequalities of children in original endowment and to differentiate the course of study in such a way that each child will be allowed to progress at the rate which is normal to him, whether that rate be rapid or slow. (Terman, 1916, p. 4)

Terman's educational prescriptions became the stock and trade of educational psychology. An excellent example of the

collective effect of attitudes of the day is seen in a textbook called Educational Psychology by Daniel Starch, a widely read consultant in applied psychology and commercial research from the University of Wisconsin and Harvard University. First published in June 1919, Starch's book warranted thirteen reprints between January 1920 and August 1926 and was published in a revised edition in July 1927. Starch maintained an air of objectivity throughout the book, but the preponderance of evidence of the aforementioned timbre had become the foreordained limits of his academic domain. Therefore, Starch's educational psychology consisted of two parts: first, a list of the "native equipment of human beings," and second, the psychology of learning. Each part was treated independently (Starch, 1927, p. 3).

About mental heredity Starch cautiously put forth that "the view held by most scientific students of the problem today gives weight to both elements with perhaps the major emphasis upon heredity" (Starch, 1927, p. 82). But he continued into a survey of the research on the question, and relying heavily on the research of Galton, R.G. Dugdale (author of the Max Juke family history) and Goddard's Kallikak family, he concluded "that much defective mentality, degeneracy, and crime is a matter of ancestry" (Starch, 1927, p. 86). He also placed faith in the ability of the new intelligence tests to measure "native ability," although he qualified "native" to mean ability "that has not been directly affected by specific training" (Starch, 1927, p. 109). Starch emphasized the role

of psychological testing in the business world, for "proper adjudication" by the courts, and for selective immigration (Starch, 1927, p. 108). However, one of his main concerns was the placement of students, especially the gifted, in classes designed for their intellectual capacities (Starch, 1927, p. 109). The special classes for gifted and defective students would be fewer, of course, due to the normal distribution of intelligence. Starch refers to the nature of variation by repeating a statement by Lincoln: "God must have loved the common people because He made so many of them."

Starch relies on Terman's Stanford-Binet as the means for classifying pupils and engages in a bit of Terman's scientific theatrics by taking time and space to repeat Terman's attempt to estimate Galton's I.Q., though Galton had been dead sixteen years. Terman used some of Galton's childhood letters and other records to posthumously award Galton an I.Q. of 200. This means that when Galton was 10 years old he had displayed the mental age of a 20 year old. The following brief letter written by Galton at age 10, according to Starch, "represents maturity of judgement and intellectual interest worthy of a high school or college student" (Starch, 1927, p. 116).

December 30, 1832

My Dearest Papa:
It is now my pleasure to disclose the most ardent wishes of my heart, which are to extract out of my boundless wealth in compound, money to make this addition to my unequaled library.

The Hebrew Commonwealth by John.....9
A Pastor's Advice.....2

Hornn's Commentaries on the Psalms.....4
Paley's Evidence on Christianity.....2
Jones Biblical Cyclopedia.....10
27

(Starch, 1927, p. 116)

The fact that Galton, being an aristocrat's son, had access to unlimited tutelage in 1832 in contrast, for example, to Negroes who were outlawed from books seems not to have had a bearing on such superfluous scientific exercises and the racial attitudes they could breed.

Even with his unoriginal exaltation of I.Q. tests, Starch still remained a cultural relativist concerned for the education of the individual. He expressed his viewpoint as follows:

> Nature predominates over nurture only in the relative and not in the absolute sense. This distinction must always be borne in mind in studies of heredity. In fact, in the absolute sense, nurture predominates enormously over nature. A Newton born among Australian bushmen would no doubt have become a remarkable bushman, but never a world-renowned scientist. (Starch, 1927, p. 105)

Unfortunately it was nearly three decades later before the evidence concerning the cultural loading of mental tests began to pile up. This left Starch and others to recommend the present psychological tests as a blanket method for ability grouping. Starch described ability grouping as "by far the most popular method of adapting schools to individual differences" (Starch, 1927, p. 43). Furthermore, according to Starch,

> intelligence test results and standardized educational test results are the usual basis for the subdividing of each grade into three approximately homogeneous groups-- a bright group, an average group, and a slow group. (Starch, 1927, p. 43).

In Starch's belief, this method of sorting children became

> the logical first move to make in a conservative community in order to bring the people to a realization of the need for adapting the schools to serve the best interests of the individual children. (Starch, 1927, p. 46)

This educational practice is still with us as homogeneous ability grouping based on the differentiation of childrens' potential by standardized intelligence tests, thus forming a multi-track system of education. As Terman predicted, children are generally separated along racial and social class lines. Only recently has this philosophy been put to the test through litigation. For better than half a century the bastions of America's defenses against the weak of mind would be manned by psychologists wielding their testing artillery. Jack Fincher has expressed this by saying that,

> as nearly as anything in American education, in American life, in fact, the I.Q. test was beyond secular question. The high priests in the temples of psychology had, for ostensibly the loftiest motives, done their job well. (Fincher, 1976, p. 16)

The step that would firmly bind these psychologists to the eugenics movement was their role in World War I. On April 6, 1917, a meeting was arranged for a group of psychologists to discuss the role of psychology in the national defense. Chairing the meeting was E.B. Titchener. The meeting resulted in the appointment of an exploratory committee which immediately settled upon the necessity for developing psychological testing methods to apply to new recruits. Ultimately, a committee was gathered for this purpose at the Training School at Vineland, N.J. (Yerkes, 1948, pp. 528-529). Included in the

committee were Henry H. Goddard, Director of the Vineland Training School, Lewis M. Terman of Stanford University, and the chairman Robert M. Yerkes of Harvard, then president of the American Psychological Association. These men became commissioned officers in the Division of Psychology, a branch of the Army's Sanitary Corps (Yerkes, 1948, p. 530).

In 1921 Yerkes' official report of the accomplishments of the Division of Psychology during the war effort was published in the Memoirs of the National Academy of Sciences. Between September 1917 and January 31, 1919, a grand total of 1,726,966 men were tested in 35 army training camps (Yerkes, 1948, p. 531). Terman's Army Alpha test was administered to literates and a nonverbal test called the Army Beta was administered to illiterate and non-English speaking recruits via pantomime. The purpose was to aid in job classification of the troops. The data from these tests provided the first massive statistical demonstration that blacks scored lower on intelligence tests than whites. But more important during this period was the data concerning the "Relation of Intelligence Ratings to Nativity." Of the troops tested 12,407 were foreign born, and their ratings, which were letter assignments ranging from A through E, were separated by country. These data, edited by Titchener's ex-student E.G. Boring, exhibited the vast difference between the high scoring sons of the Teutonic nations and the low scoring progeny of Latin and Slavic origin (Kamin, 1974, pp. 17-19).

Information of this nature was immediately embraced by those who were pushing for restrictions on immigration

including those elements in the Senate and Congress to whom these data became "generally known" (Kamin, 1974, p. 19). In fact, the mental testers, certain members of the Senate and Congress, and the American eugenicists were in such firm agreement in their positions on immigration that principles from each area joined together to promote restrictive immigration legislation.

Between 1907 and 1911 the Senate Immigration Commission, headed by Senator William P. Dillingham of Vermont, was busy gathering immense quantities of data from firsthand examination of the immigration problem. The evidence was overwhelming in its sheer bulk; the official Report of the commission filled forty-two volumes, the majority of which were dedicated to meticulously tracing the immigration from southern and eastern Europe. The Report proclaimed there to be a causal relationship between the "new immigration" and the economic crises in the United States during the same period. Arguments to the contrary, such as that by Jesse Hourwicz who pointed out that there was a negative, not a positive, correlation between unemployment and immigration, were smothered under the weight of the massive official information (Petersen & Matza, 1963, pp. 201-202). With this government slant it was inevitable that American eugenicists would play an active role in policy formation.

In 1918 the Galton Society was founded and initially chaired by Madison Grant, author of The Passing of the Great Race. On March 9, 1918, Grant wrote to Henry Osborn suggesting the following:

> My proposal is the organization of an anthropological society (or somatological society as you call it) here in New York City with a central governing body, self elected and self perpetuating, and very limited in members, and also confined to native Americans, who are anthropologically, socially and politically sound, no Bolsheviki need apply. (Kamin, 1974, p. 19)

Grant's own racial concepts were the product of fanatical misinterpretations of the laws of genetics. In The Passing of the Great Race he stated that "the cross between a white man and an Indian is an Indian; the cross between a white man and a negro is a negro; and the cross between any of the three races of Europe and a Jew is a Jew" (Pole, 1978, p. 233). However, Grant's naive views did not prevent him from recruiting able members. Included in the nine Charter Fellows was Edward L. Thorndike, then a consultant to Yerkes' Army testing program. The Galton Society invited scientific papers on pertinent subjects and acted as advisers to relevant government agencies (Kamin, 1974, p. 19).

Grant eventually gathered and published a collection of opinions on the "new immigration" under the title The Alien In Our Midst or "Selling Our Birthright For A Mess Of Industrial Pottage." There were papers in this book by some very influential individuals. Grant himself had an entry entitled "Closing The Flood-Gates" which reflected his optimism toward "the increasing force of science, of eugenics and of an ever-widening acceptance of the fact that heredity and not environment dominates in the evolution and development of man" (Grant, 1930, p. 23). According to Grant, science is our only hope

in solving the "serious Negro problem" as well as the immigrant problem which he saw as "the thirty pieces of silver in a new form" (Grant & Davison, 1930, p. 48).

C.B. Davenport, then Director of the Department of Genetics at the Carnegie Institute of Washington and the Eugenics Record Office at Cold Spring Harbor, N.Y., contributed a paper which concluded with, "we may expect the ever-broadening appreciation of the value of hereditary quality to support henceforth the policy of limited and selected immigration" (Davenport, 1930, p. 53). Geneticist Lothrop Stoddard added that "as long as it remains disturbed and backward, Eastern Europe must continue to be a breeding ground for swarms of would-be emigrants of a most undesirable character" (Stoddard, 1930, p. 228).

Two other contributions to Grant's book were members of the Eugenics Research Association and had a particular influence on immigration legislation. They were the Honorable Albert Johnson, chairman of the Eugenics Research Association and also chairman of the House Committee on Immigration and Naturalization, and geneticists Harry Laughlin, secretary of the Eugenics Research Association and "expert eugenics agent" of the House Committee on Immigration and Naturalization and Superintendent of the Eugenics Record Office of the Carnegie Institute of Washington. In 1920 the Eugenics Research Association received a rush of experimental psychologists who had served under Yerkes in World War I. Yerkes himself headed a committee on Scientific Problems of Human Migration for the

Division of Anthropology and Psychology of the National Research Council. The purpose of Yerkes' Committee was also to apply scientific methods to the immigration problem (Kamin. 1974, p. 19). The first research supported by the National Research Council was that of Carl Brigham, professor of Psychology at Princeton University. In his 1923 book A Study of American Intelligence, with a forward by Yerkes, he reanalyzed the Army data and concluded that as the number of immigrants of Alpine and Mediterranean blood increased, the intelligence of immigrants decreased. He went on to say that "the Nordics are... rulers, organizers, and aristocrats," whereas, "the Alpine race is always and everywhere a race of peasants...The Alpine is the perfect slave, the ideal serf" (Kamin, 1974, p. 21). Furthermore, "we are incorporating the negro into our racial stock, while all of Europe is comparatively free from this taint," therefore, "the decline of American intelligence will be more rapid than the decline of the intelligence of European national groups" (Kamin, 1974, p. 21). It was for these reasons that he recommended revision of the immigration laws.

Brigham went on to become secretary of the College Entrance Examination Board where he developed the Scholastic Aptitude Test. In 1929 he became secretary of the American Psychological Association, and after his death the Educational Testing Service gave its library his name. Brigham eventually retracted his interpretation of the Army data, but it was years after the immigration laws had been revised. The 1923 Journal of Educational Psychology hailed Brigham's "logical and careful analysis" of the army tests (Kamin, 1974, p. 22).

Harry Laughlin represents "the most direct connection between racist doctrine and American immigration policy" (Petersen & Matza, 1963, p. 202). In 1922 he submitted a report to the House Committee for whom he worked entitled Expert Analysis of the Metal and the Dross in America's Melting Pot which so impressed Congress that it has been credited as the fundamental basis of the Immigration Act of 1924. Using what he called "contingency analysis," Laughlin demonstrated that the distribution of social ills was not random, and he concluded that all foreigners, especially those from southern and eastern Europe, were inferior. According to Laughlin, these groups were particularly susceptible to certain social inadequacies which are "inherited in the blood" (Petersen & Matza, 1963, p. 203). Thus, Laughlin arrived at the following policy recommendations,

> There has, thus far, been no suggestion in our laws of any requirement except personal value in our sorting of would-be immigrants....the surest biological principle to direct the future of America along safe and sound racial channels is to control the hereditary quality of the immigration stream. (Petersen & Matza, 1963, p. 203)

This report was submitted to the U.S. House of Representatives' Hearings Before the Committee on Immigration and Naturalization chaired by Albert Johnson on November 21, 1922 (Petersen & Matza, 1963, p. 202). Subsequent testimony before the hearing committee was in full support of Laughlin's policy recommendations, and some of the most damning evidence against those dubbed as "human garbage" by Henry George (Pole, 1978, p. 243) came from the mental testing area. On February 20,

1923, Dr. Arthur Sweeney's views on "Mental Tests for Immigrants" had been added as an appendix to the committee hearings. Sweeney lamented the fact that "we have been overrun with a horde of the unfit" but that now "the psychological tests...furnished us with the necessary yardstick" (Kamin, 1974, p. 23). If steps were not taken to curb the tide of the unfit "we shall degenerate to the level of the Slav and Latin races." However, with "the perfect weapons formed for us by science...it is now as easy to calculate one's mental equipment as it is to measure his height and weight" (Kamin, 1974, p. 24).

Harry Laughlin was back before the committee on March 8, 1924, lecturing from the position of a "scientific spirit" (Kamin, 1974, p. 25). He used Brigham's tables augmented by his own to display the proportions of Grade A through E men in the various countries. The D and E men were described by the phrase "cost of supervision greater than value of labor. Untrainable socially or economically" (Kamin, 1974, p. 26). According to Laughlin there were 2,060,262 foreign born white men of the trainable status already in the country, as well as, another 4,287,573 D aliens.

With comprehensive evidence from experts in so many scientific fields espousing a need for racial selectivity, it is no wonder that concerned politicians fell victim to the infectious prejudice. At the conclusion of the House and Senate Committee hearings, the need for quality control of immigration was firmly entrenched in the minds of government

officials. The last vital element of racial restrictionism was won after much debate in Congress, when it was decided that a quota system based on the 1910 census discriminated against older American stocks (Pole, 1978, p. 242). With the backing of the public at large as well as the majority of their peers, Albert Johnson and Henry Cabot Lodge, Sr., the patrician nativist who had begun in 1905 to establish a systematic ideology of distinction between an "old" and a "new" immigration, jointly authored the Johnson-Lodge Immigration Act of 1924 (Pole, 1978, p. 228). The act reduced national origin quotas from 3 percent annually to 2 percent based on the census of 1890 which was taken before the alien influx from southern and eastern Europe began. Professor Leon Kamin aptly describes the result of the Act of 1924 in the following passage:

> The new law made the country safe for Professor Brigham's Nordics, but it did little for the safety of Alpines and Mediterraneans. The law, for which the science of mental testing may claim substantial credit, resulted in the deaths of literally hundreds of thousands of victims of the Nazi biological theorists. The victims were denied admission to the United States because the "German quota" was filled, although the quotas of many other Nordic countries were vastly undersubscribed. The Nazi theoreticians ultimately concurred with biologist Laughlin's assessment that, in the case of D- and E people, "Cost of supervision greater than value of labor." (Kamin, 1974, p. 27)

As if to add insult to injury, a National Research Council Fellowship in Psychology was held by Dr. Nathaniel Hirsch at Harvard and the results, which included mental tests of various immigrant groups, were published in 1926. The report in the Genetic Psychology Monographs "proved" the genetic origin of

the deficiencies of the immigrant groups. Hirsch quoted an earlier observer as saying,

> I have seen gatherings of the foreign-born in which narrow and sloping foreheads were the rule...In every face there was something wrong--lips thick, mouth coarse...chin poorly formed... sugar loaf heads...goose-bill noses...a set of skew-molds discarded by the Creator...Immigration officials...report vast troubles in extracting the truth from certain brunette nationalities. (Kamin, 1974, p. 28)

The public mind had been afflicted by a mass of scientific evidence. It is even said that President Calvin Coolidge burst forth with an "actual display of enthusiasm" (Karp, 1976, p. 52) over the 1924 law. The academic world soon tempered its position through the efforts of such scholars as Lester Frank Ward and Franz Boas, the former a self taught sociologist, the latter an anthropologist at Clark University. Both argued against physical and racial determinism as factors in intelligence although Boas still placed great emphasis on the cephalic index. However, as J.R. Pole states, "it would have been a flight of improbable optimism to have equated university departments with public opinion" (Pole, 1978, p. 241).

The immigration laws continued to be a product of "alarmist period" doctrine. The basic law today is the Immigration and Nationality Act, also known as the McCarran-Walter Act, passed in 1952 (Carliner, 1977, p. 208) over President Truman's veto. Pat McCarran, ironically, was the son of a poor Irish immigrant who made it all the way to the U.S. Senate but failed to become a champion of the people from whence he came (Peterson & Matza, 1963, p. 197). In 1954

John Campbell Bruce included in his book The Gold Door: The Irony of Our Immigration Policy the following passage:

> The McCarran Act, in its codification, picks up from 1917; wraps all the intervening statutes into one big unwieldy package; tightens up old restrictions, and tacks on a few score more. (Campbell, 1954, p. 28)

Until the Cellar Act of 1965, which modified immigration policies by removing country quotas, regulations for hemisphere quotas remained under the influence of Laughlin's and Grant's racist pseudo-scientific philosophy (Karp, 1976, p. 52). Even now there is a list of more than 30 broadly stated grounds upon which an immigrant may be excluded from admission to the United States. The first three items on the list state specifically that aliens are to be excluded if they are "mentally retarded," have had "one or more attacks of insanity," or are "afflicted with psychopathic personality, sexual deviation, or a mental defect." Illiteracy ranks eleventh on the list behind "paupers, professional beggars, and vagrants" and ahead of security risks and communists (Carliner, 1977, pp. 29-30).

The effects of the American Eugenics movement did not stop at immigration policy. Another result of the tireless efforts of Dr. Laughlin et al. was the passage by more than half the states in the union of compulsory sterilization laws. Court-ordered sterilization on an individual basis was nothing new, i.e. Buck v. Bell settled by Justice Holmes, but Laughlin aimed at entire subpopulations including the mentally retarded, criminals, epileptics, drunkards, drug addicts, the blind, the deaf, the deformed, the insane and other groups deemed

"socially inadequate." Another group labeled "dependent" included tramps, paupers, orphans, and ne'er-do-wells. Fortunately, these American sterilization laws were never rigorously enforced, although California in the 1920's sterilized 10,000 mentally retarded individuals with no improvement in I.Q. in the general population. But the weeding out of "socially inferior" groups became official party policy of the Nazi government (Karp. 1976, p. 52).

The American eugenics movement had drawn criticism throughout its history. As early as 1913 Dr. David Heron of the Galton Laboratory launched a polemic attack on the first results issued from Davenport's newly established Eugenics Record Office founded in 1910. Heron referred to this research as "careless presentation of data, inaccurate methods of analysis, irresponsible expression of conclusions and rapid change of opinion...The Mendelian conclusions drawn have no justifications whatever" (Dunn, 1962, p. 298). This criticism cut to the core of methodology rather than remaining at the surface of the biometrician vs. Mendelian arguments. In 1922 G.K. Chesterton published Eugenics and Other Evils in London rebelling against the mistake of accepting a Prussian pattern for the whole world. About eugenics he said, "even if I were a eugenist I should not personally elect to waste my time locking up the feeble-minded. The people I should lock up would be the strongminded" (Dunn, 1962, p. 299). In 1925 H.S. Jennings attacked the acceptance of unit characters and an either-or distinction between heredity and environment.

In 1928 Raymond Pearl stated that "orthodox eugenists are going contrary to the best established facts of genetical science and are in the long run doing their cause harm" (Dunn, 1962, p. 299). Although these objections were mere pin-pricks to the body of the eugenics movement, their analyses and prognostications were ultimately proven true; but it took the occurrence of shocking events and scientific realities to jolt Americans from their intolerant position.

The American eugenics movement in its original form was swept under the carpet by the late 1930's. One reason for its demise was the popular abhorrence of the Nazi perversions in the name of Rassenhygiene. Another factor was the decline of Social Darwinism as a viable philosophy which began with the stock market crash in October 1929. The severe economic depression of the early 1930's made it blatantly obvious that material success could no longer be considered a hereditary trait. The final blow to this era of eugenics came from the science of genetics itself. Genetic scientists had been steadily gathering and publishing data which exposed the absurdity of eugenic policies (Karp, 1976, p. 53). In 1932 the severest of academic blows was dealt eugenics when British geneticist Lionel S. Penrose published his paper entitled "On the interaction of heredity and environment in the study of human genetics (with special reference to Mongolian imbecility)." It was in this report that Penrose mathematically demonstrated that mental retardation could not result from the effect of a single gene--this deprived American eugenics of its fundamental theoretical underpinning (Dunn, 1962, p. 305).

By the time Penrose published his paper in 1932 educational psychology had already found an interesting new question regarding nature-nurture; what is the relative contribution of nature and nurture to intelligence? Probably the first scientific study to deal with this question was conducted by Barbara Stoddard Burks (1902-1943). She published the results in 1928 in the Twenty-seventh Yearbook of the National Society for the Study of Education under the title "The Relative Influence of Nature and Nurture Upon Mental Development: A Comparative Study of Foster Parent-Foster Child Resemblance and True Parent-True Child Resemblance." Burks' conclusions have a familiar ring to anyone acquainted with the modern controversy:

> 1. Home environment contributes about 17 percent of the variance in I.Q.: parental intelligence alone accounts for about 33 percent.
>
> 2. The total contribution of heredity (i.e. of innate and heritable factors) is probably not far from 75 to 80 percent.
>
> 3. Measurable environment one standard deviation above or below the mean of the population does not shift the I.Q. by more than 6 to 9 points above or below the value it would have had under normal environmental conditions. In other words, nearly 70 percent of school children have an actual I.Q. (test score) within 6 to 9 points of that represented by their innate intelligence.
>
> 4. The maximal contribution of the best home environment to intelligence is apparently 20 I.Q. points, or less, and almost surely lies between 10 and 30 points. (Burks, 1948, p. 556).

Burks used the correlation coefficient to partition variance into its environmental and hereditary components. Her sample consisted of white middle class California children. Questions

regarding nature-nurture among educational psychologists generally used the methodology of Burks.

Eugenics showed its phoenix-like behavior by reemerging in the late 1940's (Karp, 1977, p. 53) in genetics after the beginning of the modern genetics period and manifested itself through classical interpretations of advances in molecular genetics and at the higher levels in the evolution of populations. For example, in 1950 H.J. Muller published "Our load of mutations" in the American Journal of Human Genetics. It will be remembered from the previous chapter that Muller had been inspired to analyze natural populations for frequencies of mutant alleles and the effects of natural selection on a population's genetic potential (termed microevolution). Muller eventually received a Nobel Prize for his investigations of gene mutations in Drosophilia (fruit flies). In the 1950 article Muller espoused the tenebrific doctrine that man will ultimately face a "genetic twilight," because we will eventually carry an intolerable load of mutations within the population. For this reason Muller borrowed and recommended the concept of eutelegenesis from Herbert Brewer's 1935 article of the same name in the Eugenics Review (Karp, 1977, p. 53). Brewer defined eutelegenesis as "reproduction from the germ cells of individuals between whom there is no bodily contact," as applied to "the eugenic breeding of man" (Karp, 1977, p. 219); in other words, artificial insemination from good breeding stock. Muller envisioned regulatory committees gathering the sperm of great men to offset the increasing

mutation rate caused by radiation and foreign chemicals (Karp, 1977, p. 53).

The line of inquiry followed by Muller and others has descended to the molecular level of genetic inquiry having been sustained by the post-1940 rise in the molecular approach to gene structure and maintained by the advocacy of newer eugenic methods such as cloning and in vitro fertilization in the modern recombinant DNA controversy (Karp, 1977, p. 54; Ravin, 1965, p. 2).

The nature-nurture controversy as engaged in by psychologists and population geneticists is of a different brand, although the ethical issues remain the same. University of Wisconsin population geneticist James F. Crow exemplifies a conservative attitude on genetics that has been equated with a modern form of eugenics. Crow was one of the scholars who was invited by the editorial board of the Harvard Educational Review to respond to Jensen's 1969 article in the previous issue of that journal. In his response Crow wrote, "I agree for the most part with Jensen's analysis...and I as a population geneticist, admire his understanding of the methods and his diligence and objectivity in bringing together evidence from diverse sources" (Crow, 1969, p. 302).

However, Crow stands in even firmer approval of Jensen's prescriptions for education than in his methodology, since he also shares Muller's concern for the status of our collective gene pool. As Crow expresses it,

> I am an ardent conservationist...I am quite willing to put severe restrictions on this

> generation in order to have a better environment next generation. I am quite willing to put restrictions on individual freedoms this generation in order to have a lower mutation rate for the benefit of our posterity. (Karp, 1977,p. 53)

The variant views of geneticists on mutation rate will be considered in a subsequent chapter. The importance of Crow's statement in the present context is his willingness to subject the existing population to restrictive legislation as a result of his concern for the effect of the present gene pool on future generations. His predilection has been shared by a long line of social scientists and is firmly entrenched in the Jensenist controversy today. However, it is only fair to point out that Crow emphasizes the limitations in generalizing from one population to another on the basis of within group heritability estimates. As a population geneticist, Crow is fully aware of the characteristics of heritability estimates as a function of phenotypic fluctuations in the population.

Educational psychology completely separated itself from eugenics as the tide of public opinion shifted in the 1930's and 1940's. But the I.Q. controversy apparently became no less fascinating for many in the field. In the United States and England work continued on studies of separated twins, kinship correlation studies, and studies of adopted children. Researchers made use of the mathematical techniques of population genetics to attack the problem of sorting out the relative contribution of heredity and environment to intelligence.

An important tool in assessing how phenotypic characteristics are transmitted from generation to generation is the "heritability estimate." The etymology of the word heritability is not specifically known, but it seems to have evolved through three stages. In its first usage which began around 1832 it was used to denote the hereditary transmission of characteristics or material things, which meant it was used legally as well as biologically. The second stage began around the beginning of the twentieth century following Johanssen's classical definition of nongenetic or environmental fluctuations distinct from genotypic differences. This definition approximates what is termed "broad sense heritability" translated from Johanssen's Erblichkeit. The modern version of heritability or what we now call "narrow sense heritability" came about in 1936 following the publication by Dr. J.L. Lush of "Genetic Aspects of the Danish System of Progeny Testing Swine" in the Iowa Research Bulletin. Narrow sense heritability is defined as the ratio of additive genetic variance to the total phenotypic variance within a population (Bell, 1977, p. 300).

There are complex formulae for estimating heritability, but for the present let us just say that heritability, denoted h^2, is a number between 0 and 1 which may be obtained from quantitative traits in several ways including midparent-offspring correlations, the difference between intraclass correlations of monozygotic (identical) and dizygotic (fraternal) twins, full-sibling and half-sibling analysis, and directly through the regression on midparent of the average of any

number of offspring (though this case assumes additivity) (Wright, 1968, pp. 425-426). Since h^2 represents a squared portion of variance, it may be spoken of as a proportion or percentage due to hereditary factors. For this reason one may hear a report that studies have found intelligence to be .80 or 80% determined by heredity, as in fact Cyril Burt and Arthur Jensen have stated. Therefore, the types of analyses carried on by educational psychologists from the time of Burks' first study have lead to conclusions about the heritability of intelligence. Studies attempting to demonstrate the influence of environment have generally relied on differences in intellectual improvement between subjects from deprived and subjects from enriched environments. Professor Leon Kamin has made an extensive critique of the major studies of nature-nurture in his 1974 book The Science and Politics of I.Q. Although I have made and will make liberal reference to Dr. Kamin's book, one must read it in its entirety to receive the full impact of his conclusions. For our present purposes it will serve as a brief bibliographical sketch of the major works in the area.

Ordered chronologically, the studies examined by Dr. Kamin begin with the Burks study and the F.N. Freeman, K.J. Holzinger, and B.C. Mitchell study entitled "The Influence of Environment on the Intelligence, School Achievement, and Conduct of Foster Children." Both of these dealt with foster children, and both were reported in the Twenty Seventh Yearbook of the National Society for the Study of Education. In

1935 A.M. Leahy published an adoption study "Nature-Nurture and Intelligence" in Genetic Psychology Monographs. In 1937 H.H. Newman along with Freeman and Holzinger published Twins: A Study of Heredity and Environment. In 1945 the regularly quoted adoption study by M. Skodak and H. Skeels was published in the Journal of Genetic Psychology under the title "A Follow-Up Study of Children in Adoptive Homes." In 1962 the J. Shields study entitled "Monozygotic Twins Brought Up Apart and Brought Up Together" was published. In 1962 and 1968 came Vandenburg's noteworthy work in the Michigan and Louisville twin studies. Kamin feels these works exemplify empirical and theoretical approaches in estimating heritability from monozygotic and dizygotic twins (Kamin, 1974, p. 96). In 1965 the N. Juel-Nielsen study was published in Denmark under the title "Individual and Environment: A Psychiatric-Psychological Investigation of Monozygotic Twins Reared Apart" in Acta Psychiatrica et Neurologica Scandinavica.

In a subsequent chapter some of these and other works will be mentioned in more specific detail, but the purpose here is merely to point out that interest in nature-nurture and intelligence did not fade with the changing times. The following case makes this point vividly clear. In 1963 Science published an article by L. Erlenmeyer-Kimling and L.F. Jarvik with the title "Genetics and Intelligence: A Review." In describing the article Professor Vandenburg said it was "a paper that condensed in a few pages and one figure probably more information than any other publication in the history

of psychology" (Kamin, 1974, p. 75). The one figure of which Vandenburg spoke was the central feature of the article since it reported the span of correlation coefficients for no less than 52 studies. This figure, which has been cited by innumerable authors including Burt, Herrnstein, and Jensen, encompassed 30,000 correlation pairs. As Professor Kamin has said of the "quantitative force" of the Erlenmeyer-Kimling and Jarvik study, "thirty thousand correlation pairs cannot, evidently, be wrong" (Kamin, 1974, p. 75). The strength of the data was immediately halved by Professor Kamin when he pointed out that in the fourth footnote of their article Erlenmeyer-Kimling and Jarvik, providing a breakdown of the correlation pairs, explain that 15,086 pairings were unrelated children reared apart. Since the theoretical correlation between children sharing neither genes nor environment is zero, half the thirty thousand pairs are of no interest (Kamin, 1974, p. 75).

Nevertheless, Erlenmeyer-Kimling and Jarvik have provided fifty years of nature-nurture studies recapitulated in one chart. Furthermore, they excluded many studies for one of four reasons: 1) if the test used was an achievement test, scholastic performance test,or subjective rating of intelligence, 2) if the subjects were of a special type, i.e. mental defectives, 3) if there was inadequate information concerning twin zygosity, or 4) if too few twin pairs were used (Erlenmeyer-Kimling & Jarvik, 1963, p. 1477). They reported only studies such as Newman, Freeman, and Holzinger, Juel-Nielsen, and

Shields; and still fifty two major studies could be reported from the Burks study until the Erlenmeyer-Kimling and Jarvik article.

Erlenmeyer-Kimling and Jarvik provided powerful evidence that hereditarian ideals based on scientific evidence never really faltered in the academic arena. The following statements by them demonstrate the undaunted authority of the correlation coefficient.

> Taken individually, many of the 52 studies reviewed here are subject to various types of criticism (for example, methodological). Nevertheless, the overall orderliness of the results is particularly impressive if one considers that the investigators had different backgrounds and contrasting views regarding the importance of heredity. Not all of them used the same measures of intelligence, and they derived their data from samples which were unequal in size, age structure, ethnic composition, and socio-economic stratification; the data were collected in eight countries on four continents during a time span covering more than two generations of individuals. Against this pronounced heterogeneity, which should have clouded the picture, and is reflected by the wide range of correlations, a clearly definitive consistency emerges from the data....We do not imply that environment is without effect upon intellectual functioning; the intellectual level is not unalterably fixed by the genetic constitution. Rather, its expression in the phenotype results from the patterns laid down by the genotype under given environmental conditions. (Erlenmeyer-Kimling & Jarvik, 1963, p. 1478)

The last qualifying statement above is a point which Jensen also makes in his 1969 article and is not, at least in obvious form, part of the Jensenist controversy. Jensen states that "genotype, by definition, is 'fixed' at the moment of conception [but] intelligence is a phenotype, not a genotype, so the

argument about whether or not intelligence is 'fixed' is seen to be spurious" (Jenson, 1969b, p. 17). There is, however, a more subtle way in which the concept of fixation in the form of genetic typing under the classical characterization of variation manifests itself in certain conservative positions to which Jensen apparently adheres. We shall refer to this later as the classical vs. the balance hypothesis.

By now it should be clear that the type of research begun by Burks in 1928 was not discontinued as public opinion shifted. Furthermore, professional orientations varied over a broad range as pointed out by Erlenmeyer-Kimling and Jarvik. Conjecture as to the nature of intelligence by scientists interested in the subject also continued, and more hypothetical constructs were extracted from mathematical manipulation of intelligence tests. The factor analytic technique was carried forward mainly by Thomson at Edinburgh, Cyril Burt at London, and Louis Thurstone at Chicago (Boring, 1950, p. 481). Burt, one of Jensen's mentors, has more recently become the subject of controversy centering around the honesty of his research. We will take a closer look at this when Jensen's work is discussed.

Louis Thurstone, an electrical engineer, used factor analysis to identify more distinct abilities than Spearman's g. His methods were adopted by those interested in occupational guidance, especially his technique of "simple structure" rotation of axes to partition g (Cronbach, 1970, p. 326). In 1938 Thurstone isolated from a battery of 56 tasks a group of

factors which he named primary mental abilities, so named to suggest that these abilities combine in different ways to allow success in more complex intellectual endeavors. The seven primary mental abilities most prominent in Thurstone's works are verbal, numerical, spatial, memory, reasoning, word-fluency, and perceptual speed (Cronbach, 1970, p. 326). Jack Fincher adds a pessimistic note to his description of these abilities by saying,

> the idea that you could be strong in one or more and weak in others, with all its inherent possibilities for a truly useful diagnostic test, seems largely to have escaped the notice of the embryonic profession that was psychology. (Fincher, 1976, p. 179)

Nevertheless, Thurstone did recommend great caution in the use of factor analysis and was not one to wield such a technique with abandon. In his 1947 book entitled Multiple Factor Analysis he included a section on the suggested role of the technique in science. To him the purpose of factor analysis is to discover the underlying order of a domain "without first postulating it in the form of a hypothesis" (Thurstone, 1947. p. 56). This underlying order can be revealed in the form of mathematical factors. The names we give these factors, i.e. causes, faculties, parameters, or abilities, "depends on the context, on one's philosophical preferences and manner of speech, and on how much one already knows about the domain to be investigated" (Thurstone, 1947, p. 56). In other words, factor analysis merely describes the variance inherent in a set of data. For this reason Thurstone continued to clear up a common misunderstanding of

the technique. To him "factor analysis has its principal usefulness at the border line of science...The new methods have a humble role. They enable us to make only the crudest map of the new domain" (Thurstone, 1947, p. 56). This is a far cry from Spearman's "momentous observation" of g.

Thurstone's caution allowed him to go no further in the description of mental phenomenon than to say,

> in the interpretation of mind we assume that mental phenomena can be identified in terms of distinguishable functions, which do not all participate equally in everything that mind does. (Thurstone, 1947, p. 57)

But to this Thurstone also added the qualification that "no assumption is made about the nature of these functions, whether they are native or acquired or whether they have a cortical locus" (Thurstone, 1947, p. 57). This too would depend on the philosophical preference of the investigator not on the nature of the technique.

Beginning in 1941 Raymond B. Cattell, protege of Burt and Spearman, began espousing his breakdown of g into two factors called "crystallized" and "fluid" general ability (denoted gc and gf, respectively) (Fincher, 1976, p. 179). Crystallized ability refers to "those cognitive performances in which skilled judgement habits have become crystallized (whence its name) as the result of earlier learning application of some prior, more fundamental general ability to these fields" (Cattell, R.B., 1963, pp. 2-3). This can be equated with Thurstone's verbal and numerical primaries or achievement in geography or history. "Fluid general ability, on the other

hand, shows more in tests requiring adaptation to new situations, where crystallized skills are of no particular advantage" (Cattell, R.B., 1963, pp. 2-3).

Cattell's nature-nurture variance ratio for gc and gf anticipated Jensen's Level I and Level II intelligence in a slightly different form. As Cattell describes it,

> For any same-age group the nature-nurture variance ratio will be higher for gf than gc on the hypothesis that gf is directly physiologically determined whereas gc is a product of environmentally varying, experientially determined investments of gf (Cattell, R.B., 1963, pp. 3-4)

Cattell's model is built upon what he calls Multiple Abstract Variance Analysis. Cattell came upon this while "pondering the limitations of the twin study method...one day on a deserted cove near Dartmouth in Devonshire" (Cattell, R.B., 1974, p. 113). Cattell for example, "factors culturally embedded with culture-fair intelligence measures on a background of pure personality primaries" to extract general factors (Cattell, R.B., 1963, p. 1). He also believes that traditional I.Q. tests measure the crystallized ability and only culture-fair tests measure fluid ability (Cattell, R.B., 1963, p. 20). As a result of his methods, Cattell's genetic component for gf is somewhat higher than the twin method. In making this point about a 1957 study he states,

> Burks (1928), Freeman, Eysenck, and others used twin methods in which the environmental difference range (that between twins) is smaller than in the total family of sibs, as in our studies. Since the actual ratios we obtained with Culture Fair Tests are close to the mean of those they obtained with traditional tests, despite our environmental range being larger, the Culture Fair Tests can be concluded to have lower environmental determination.

> Our ratios were..,70% genetic contribution for twins, and..,90% for the genetic component in between-family variance in gf (Cattell, R.B., 1963, p. 4)

In recent years Cattell has turned his attention and methods mainly to the study of personality, but he has remained outspoken in his support of behavior genetics. In a 1974 article entitled "Travels in Psychological Hyperspace" Cattell blames Hitler and the "ignoracist counter-prejudices" against him as well as the "willful or stupid misreadings of Jefferson's fine words in the Constitution" for the post-1940 taboo against behavior genetics (Cattell, R.B., 1974, p. 112). Although he is probably referring to Jefferson's fine words in the Declaration of Independence and not the Constitution, the historical point is made.

As a result of his philosophical and methodological position, Cattell expresses "astonishment...that Watsonian reflexology could be taken so seriously that perhaps one half of all psychologists are content to be more ignorant than the shrewd man-in-the-street about behavior genetics" (Cattell, R.B., 1974, p. 112). To further make his point he condemns "the recent hooliganism of students attacking Jensen, Eysenck, and the Nobelist Shockley"as an illustration that "the less intelligent can be depended upon in the name of progress to embrace the exploded doctrinaire views of the last generation's avant-garde" (Cattell, R.B., 1974, p. 113). Cattell's attitudes present a mild example of the emotional reactions stirred by the recent controversy.

The most recent popularized attempt at sorting out the many confounding facets of intelligence is J.P. Guilford's "structure of intellect" first presented in 1967. Guilford's approach is often questioned because of its complexity. He uses a factor analytic approach in which Lee J. Cronbach says "he pushes the search for factors to its limits" (Cronbach, 1970, p. 335). Guilford felt that Thurstone's factors were not all of the same kind. Therefore, he expanded on the factor analytic approach and came up with a three way matrix of elements extracted from the ability requirements of tests. He concluded that tests could be classified according to their "content" and the "operation" and "product" each requires (Cronbach, 1970, p. 385). There are four kinds of content, five kinds of operations, and six kinds of products. This composes a matrix with 120 factors (Fincher, 1976, pp. 180-181). Guilford's model is often questioned. Cronbach states that "Guilford's factor analyses are designed to fit the data to his hypotheses; they do not tell whether his complicated scheme is necessary" (Cronbach, 1970, p. 339). Guilford himself has not clearly demonstrated all of the factors, and he has provoked disagreement over some of the ones he has purported to have found.

Out of all the myriad models of intelligence, none has been universally accepted and the attempts at a conclusive answer as well as the types of tests used as measuring instruments have come under an increasing barrage of fire in recent years. Jack Fincher has compared the whole business of seeking

the structure of intelligence to what E.B. White said about humor:

> (It) can be dissected, as a frog can, but the thing dies in the process and the innards are discouraging to any but the pure scientific mind. (Fincher, 1976, p. 182)

The mental testing movement had been growing within the framework of changing attitudes. It adjusted itself like a shifting antigen virus, never checked in its permeation of American psychology. E.G. Boring describes the 1920's as a "decade of diminished faith in the immutability of intelligence," since the Army tests and the Stanford-Binet scale proved to be culture-bound (Boring, 1950, p. 575), but too late to help the immigrants. Galton's nature-nurture dichotomy was abandoned for an interactionist view, and expanding varieties of tests rendered mental testing and intelligence testing no longer synonymous. The 1930's, the decade of factorial analysis, saw the spread of testing into a multiplicity of practical endeavors, and the term intelligence was going out of style to be replaced by more mathematical definitions, and by the 1940's it was seen more as a product of verbal or educational training. The 1940's Boring sees as a culmination of the preceding decade. American psychology came into its own in the second world war, and it was largely, at least at first, by way of the testing. Intelligence was no longer mentioned. For the Alpha Examination of 1917-1918 there was now the General Classification Test (GCT) which took the form of Thurstone's primary abilities "which seemed most likely to measure military success" (Boring, 1950, pp. 576-

577). To conclude this section the statement by Boring seems apropos. "What history had given Galton was not a tested nation but a nation being perpetually tested" (Boring, 1950, p. 576).

Although testing grew ever more vital to American psychology, the socio-political atmosphere had taken a sharp turn toward environmentalism.

This change of emphasis had not occurred overnight, although some events stand out above others as primary causes. It, of course, took more active events in America than the reaction to Nazism to change scientific attitudes. According to John Hope Franklin, "one of the most important factors in the achievement of political respectability on the part of blacks was the New Deal policy of securing the assistance of Negro specialists and advisers in various governmental departments" (Franklin, 1974, p. 401). Dr. Franklin is, of course, referring to Roosevelt's famous "black cabinet" or "black brain trust."

Negro participation in World War II was also a major source of change. When the Selective Service Act of 1940 was enacted, more than three million Negro men registered for selection. However, due to the intitial discrimination of local draft boards and the results of the psychological tests, the rejection rate for blacks was 18.2 percent as opposed to 8.5 percent for whites. In the first year of the draft only 2,069 Negroes were selected for service. However, Negroes had the opportunity to participate more fully once

enlisted than in any previous war, and they also began working in the administration of the Selective Service, a fact which reduced discrimination. Thus, by September 1944 there were 701,678 Negroes in the Army alone and roughly one million Negroes in all branches of the service combined (Franklin, 1974, pp. 440-441).

In the postwar years Americans had to adapt to a new position of Negroes in America due to the gains the Negro had made during the war years as well as the fact that Negro organizations, especially the NAACP, were actively pushing for full equality (Franklin, 1974, p. 463).

In the scientific arena there can perhaps be no more powerful indicator of the shift to an environmentalist orthodoxy than the official statements on race issued by UNESCO in the postwar years. These statements were sweeping in scope and included evidence from anthropology, human genetics, and psychology. The Second Statement on Race issued in 1951 is an excellent example of changing attitudes. The following are some excerpts from that statement.

> Scientists are generally agreed that all men living today belong to a single species, Homo sapiens, and are derived from a common stock, even though there is some dispute as to when and how different human groups diverged from this common stock.
>
> The science of genetics suggests that the hereditary differences among populations of a single species are the results of the action of two sets of processes. On the one hand, the genetic composition of isolated populations is constantly but gradually being altered by natural selection and by occasional changes (mutations) in the material particles (genes) which control heredity. Populations are also

> affected by fortuitous changes in gene frequency and by marriage customs. On the other hand, crossing is constantly breaking down the differentiations so set up. The new mixed populations, in so far as they, in turn, become isolated, are subject to the same processes, and these may lead to further changes. Existing races are merely the result, considered at a particular moment in time, of the total effect of such processes on the human species. The hereditary characteristics to be used in the classification of human groups, the limits of their variation within these groups, and thus the extent of the classificatory subdivisions adopted may legitimately differ according to the scientific purpose in view.
>
> Most anthropologists do not include mental characterisitcs in their classification of human races. Studies within a single race have shown that both innate capacity and environmental opportunity determine the results of tests of intelligence and temperament, though their relative importance is disputed.
>
> When intelligence tests, even non-verbal, are made on a group of non-literate people, their scores are usually lower than those of more civilized people. It has been recorded that different groups of the same race occupying similarly high levels of civilization may yield considerable differences in intelligence tests. When, however, the two groups have been brought up from childhood in similar environments, the differences are usually very slight.
>
> There is no evidence for the existence of so-called "pure" races.
>
> We now have to consider the bearing of these statements on the problem of human equality. We wish to emphasize that equality of opportunity and equality in law in no way depend, as ethical principles, upon the assertion that human beings are in fact equal in endowment. (UNESCO, 1951, unpaged)

The idea that "historical and sociological studies thus support the view that genetic differences are of little significance in determining the social and cultural differences between different groups of men" as in the above statement is

one which rooted itself firmly in the social sciences of recent decades. In psychology the times were ripe for an assertion of behavioristics such as B.F. Skinner's methodological behaviorism which has enjoyed great success over the past three decades. In 1950 E.G. Boring, in his famous A History of Experimental Psychology writing on "Behavioristics" stated that, "there is no doubt that consciousness is going out of fashion in psychology at present, being replaced by these operational substitutes" (Boring, 1950, p. 621). (Boring himself, however, must have been operationally inclined when he defined intelligence as that which intelligence tests measure). Behavioristic psychology, of course, centers on manipulation of environmental contingencies in the shaping of human behavior.

Furthermore, judicial decisions were handed down on the principle that equality of opportunity and equality in law in no way depend, as ethical principles, upon the assertion that human beings are in fact equal in endowment. On May 17, 1954, the famous Supreme Court decision Brown v. The Board of Education revised the "separate but equal" philosophy of Plessy v. Ferguson which had been the guiding legal principle since 1896. The Brown decision was unanimous, and its central feature was summed up by Chief Justice Earl Warren in the following statement:

> Separate educational facilities are inherently unequal. Therefore, we hold that the plaintiffs and others similarly situated for whom the actions have been brought are, by reason of the segregation complained of, deprived of the equal protection of the laws guaranteed by the Fourteenth Amendment. (Franklin, 1974, p. 421)

Of course, the simple fact that the judicial branch of government supported equal opportunity did not pave a smooth road to civil rights for blacks. One Richmond, Virginia, newspaper referred to the Supreme Court justices as an "inept fraternity of politicans and professors [who] spit upon the Tenth Amendment, and rewrote the fundamental law of this land to suit their own gauzy concepts of sociology" (Franklin, 1974, p. 422). However, these "gauzy concepts of sociology" became the predominant view in the 1950's and 1960's.

The black community became the object of countless studies by behavioral scientists employing new psychological and sociological techniques for examining race and community. Many blacks objected to being studied as a problem and often accused these well-meaning social scientists of being more interested in the new techniques than in the human condition. The Black Revolution of the 1960's and 1970's required active involvement by blacks themselves to relieve the conditions which the social scientists pointed out (Franklin, 1974, p. 431). Mass marches, such as the march on Washington on August 28, 1963, in which 200,000 demonstrators gathered before the Lincoln Memorial, and violence, like the September 1963 bombing of a Negro church in Birmingham which killed four children, were some results of black involvement in the new move to egalitarianism (Franklin, 1974, pp. 484-485).

Passage of the Civil Rights Act of 1964 which has been called "the most far-reaching and comprehensive law in support of racial equality ever enacted by Congress" (Franklin,

1974, p. 487) helped the sixties to begin with optimism. However, hopes that desegregation would bring about a democratic educational system began to dissipate with opposition by white citizen councils and northern white mothers. Fatalism set in with the feeling that no justice or equality would be extended to blacks under any circumstances. From this dismal attitude the Black Revolution emerged (Franklin, 1974, p. 498), and into this milieu Arthur Jensen's article hit with much the same force as Darwin's bombshell.

In order to see the extent that Jensen's article was at variance with the general academic attitudes we can look at the Third Statement On Race which was released by UNESCO in 1969, the same year the Harvard Educational Review printed Jensen's article. The third statement deals with the distribution of genes in populations as does Jensen but it takes the more liberal egalitarian view. Once again some excerpts are provided here.

> Differences between individuals within a race or within a population are often greater than the average differences between races or populations.
>
> Some of the variable distinctive traits which are generally chosen as criteria to characterize a race are either independently inherited or show only varying degrees of association between them within each population. Therefore, the combination of these traits in most individuals does not correspond to the typological racial characterization.
>
> In man as well as in animals, the genetic composition of each population is subject to the modifying influence of diverse factors: natural selection, tending towards adaptation to the environment, fortuitous mutations which lead to modifications of the molecules of deoxyribonucleic acid which determine heredity, or random modifica-

tions in the frequency of qualitative hereditary characteristics, to an extent dependent on the patterns of mating and the size of populations.

Human evolution presents attributes of capital importance which are specific to the species.

The human species which is now spread over the whole world, has a past rich in migrations, in territorial expansions and contractions.

As a consequence, general adaptability to the most diverse environments is in man more pronounced than his adaptation to specific environments.

For long milleniums progress made by man, in any field, seems to have been increasingly, if not exclusively, based on culture and the transmission of genetic endowment. This implies a modification in the role of natural selection in man today.

Human races in general present a far less clearcut characterization than many animal races and they cannot be compared at all to races of domestic animals, these being the result of heightened selection for special purposes.

Heredity may have an influence in the variability shown by individuals within a given population in their responses to the psychological tests currently applied.

However, no difference has ever been detected convincingly in the hereditary endowments of human groups in regard to what is measured by these tests. On the other hand, ample evidence attests to the influence of physical, cultural and social environment on differences in response to these tests.

The study of this question is hampered by the very great difficulty of determining what part heredity plays in the average diffences observed in so-called tests of overall intelligence between populations of different cultures.

The peoples of the world today appear to possess equal biological potentialities for attaining any civilizational level. Differences in the achievements of different peoples must be attributed soley to their cultural history.

> Certain psychological traits are at times attributed to particular peoples. Whether or not such assertions are valid, we do not find any basis for ascribing such traits to hereditary factors, until proof to the contrary is given.
>
> Neither in the field of hereditary potentialities concerning the overall intelligence and the capacity for cultural development, nor in that of physical traits, is there any justification for the concept of "inferior" and "superior" races.
>
> The biological data given above stand in open contradiction to the tenets of racism. Racist theories can in no way pretend to have any scientific foundation and the anthropologists should endeavor to prevent the results of their researches from being used in such a biased way that they would serve non-scientific ends. (UNESCO, 1969, unpaged)

Certain parts of this statement, such as "the peoples of the world today appear to possess equal biological potentialities for attaining any civilizational level," stand in direct contrast to what jensenism has come to stand for. Furthermore, the last sentence of this statement set the tone for reactions to Jensen: "Racist theories can in no way pretend to have any scientific foundation and the anthropologists should endeavor to prevent the results of their researches from being used in such a biased way that they would serve non-scientific ends." Jensen's work was immediately interpreted as such a racist theory and the initial steps to counterattack it are what catapulted Jensen into instant fame as, in the words of Angela Davis, "the racist professor." We now turn our attention to Jensen and jensenism.

CHAPTER VI
JENSEN AND JENSENISM: ANACHRONISTIC HERESY

Harp not on that: nor do not banish reason
For inequality; but let your reason serve
To make the truth appear where it seems hid
And hide the false seems true.

William Shakespeare
in "Measure for Measure"

In the first chapter of this work, Jensen was compared to Darwin and Marx in terms of the controversy he has aroused. Such a comparison may or may not be historically valid, but there is no denying the bulk of written material focusing on the various aspects of "jensenism." The "ism" was attached to Jensen's name in the title of an article in the New York Times Sunday Magazine of August 31, 1969. It signifies, as do most "isms," a crystallized conception of the nature of man. The nature-nurture controversy, as this work has attempted to clarify, has always extended beyond philosophical and scientific inquisition to encompass the totality of social life. Jensen's major guilt was to speak the unspeakable while the pendulum of the American zeitgeist was poised at the nurture end of the spectrum. The fact that in the past sub-populations of various religious, anatomical, and chromatic persuasions had been made to suffer greatly from strict hereditarian interpretations of "scientific" data served to antagonize the reactions to Jensen. Those who administered

to America's sociopolitical and academic institutions had become convinced that our forefathers had known what they were about when they designed a munificent constitution tolerant of a vast array of different groups which might seek refuge in this country.

In this chapter not only will I examine some of the technical aspects of jensenism but more importantly I'll look at the implications of adherence to such a doctrine. It is the opinion of this writer that Jensen's scientific capabilities have generally been underrated, though there are aspects open to criticism, because the reactions to the extended implications of the "ism" of Jensen have perhaps blinded us to some tempering qualities which behavioral genetics may add to American educational psychology.

It is the philosophy underlying the science which determines its usefulness to the general public, and this is where the danger of jensenism lies. Notice that the term jensenism and not the name of Arthur Jensen is used here. The symbolism of the reified "ism" surrounding Jensen's name has come to carry connotations beyond Jensen's original statement in the 1969 Harvard Educational Review. Once the statement was made Jensen was swept up by the tidal wave of controversy. Jensen was "surprised and shocked" at the response to his article. In his own words, "I did not expect the tremendous public reaction that arose largely because the article was played up in the national press" (Jensen, 1969a, p. 77).

Even in the year 1969 the majority of Jensen's article would probably have passed unnoticed, and the name Arthur

Jensen would have remained unknown to a great many people if he had excluded his statements on race. He began his article with the now well-known sentence, "compensatory education has been tried and it apparently has failed" (Jensen, 1969b, p. 1). From here he proceded through 123 pages of building a genetic causal origin for this failure using research stretching back to the 1928 Burks study as evidence. Concerning the nature of intelligence it would have surprised no one that Jensen agrees with Boring that intelligence is what intelligence tests measure, or that he defines it in terms of Spearman's g. That he accepted Cattell's fluid and crystallized intelligence as a "conceptually valid distinction" would have been approved as would his extension of intelligence into its occupational relevance. Jensen would have elicited firm approval from many when, concerning the fixity of intelligence, he said, "intelligence is a phenotype, not a genotype, so the argument about whether or not intelligence is fixed is seen to be spurious" (Jensen, 1969b, p. 17). His discussion of the stability and distribution of intelligence might have even bored many readers. But on page 28 readers undoubtedly perked up as Jensen gave the first solid indication of the direction the discussion would take. On "The Inheritance of Intelligence" Jensen begins,

> 'In the actual race of life, which is not to get ahead, but to get ahead of somebody, the chief determining factor is heredity." So said Edward L. Thorndike in 1905. Since then, the preponderance of evidence has proved him right, certainly as concerns those aspects of life in which intelligence plays an important part. (Jensen, 1969b, p. 28).

In the next few statements Jensen adumbrates the source of the violent reactions to his article by stating that recent trends had "belittled, obscured, or denigrated (genetic factors), probably for reasons of interest mainly on historical, political, and idealogical grounds..." (Jensen, 1969b, p. 28). Jensen then goes on to a lengthy discussion of the concept of heritability and its relationship to quantitative genetics methodology. He provides an impressive review of research containing heritability estimates and variance components for heredity and environmental contributions to intelligence test scores as a backdrop for his conclusions. He cites the work of Sir Cyril Burt as "the most satisfactory attempt to estimate the separate variance components" (Jensen, 1969b, p. 47). Concerning kinship correlations he relies on a personally supplemented table of the Erlenmeyer-Kimling and Jarvik review and quotes their conclusions based on "over 30,000 correlational pairings from eight countries on four continents..." etc. (Jensen, 1969b, p. 48). On identical twins reared apart he cites the Newman, Freeman, and Holzinger correlation of .77 (.81 corrected for unreliability) for 19 twin pairs, the Shields correlation of .77 (.81 corrected) for 44 pairs, and the "most interesting" of these studies, the Burt study (1966) which reported a .86 (.91 corrected) correlation for 53 twin pairs. For direct measurement of the environment Jensen says, "to the best of my knowledge no study before or since has rated environments in any more detailed and fine-grained manner than did Burks" (Jensen,

1969b, p. 53). He is, of course, referring to the 1928 Burks study which is the very first of this genre. The Leahy study reporting an environmental component of only four percent is also included here. Jensen refers to the environment as a threshold variable. He states that "below a certain threshold of environmental adequacy, deprivation can have a markedly depressing effect on intelligence. But above this threshold, environmental variations cause relatively small differences in intelligence" (Jensen, 1969b, p. 60). Since studies on the heritability of intelligence have chosen samples above the threshold, heritability estimates are quite high according to Jensen. In other words, if the environment were not a source of variation in intelligence, it would have a small variance component. Much of this material probably would have been taken with a grain of salt by readers in 1969. Jensen's real trouble began when he brought his interpretations of the evidence to bear upon racial differences in intelligence.

Although, as was his pattern in most actions of the 1969 article, Jensen begins his discussion of racial differences with a qualifying distinction between the individual and the population. Nevertheless, he stepped over the lines of acceptability for 1969 and committed an act of scientific impiety. In 1974 Jensen wrote in retrospect about the 1969 article, and isolated the paragraph which sparked the explosion and catapulted him into the national limelight. That paragraph was on page 82 of his article and is reproduced in its entirety here.

> The fact that a reasonable hypothesis has not been rigorously proved does not mean that it should be summarily dismissed. It only means that we need more appropriate research for putting it to the test. I believe such definitive research is entirely possible but has not yet been done. So all we are left with are various lines of evidence, no one of which is definitive alone, but which, viewed all together, make it a not unreasonable hypothesis that genetic factors are strongly implicated in the average Negro-white intelligence difference. The preponderance of the evidence is, in my opinion, less consistent with a strictly environmental hypothesis than with a genetic hypothesis, which, of course, does not exclude the influence of environment on its interaction with genetic factors. (Jensen, 1969b, p. 82)

Also in retrospect Jensen says he had "no regrets about this statement; in fact, quite the contrary: I think it was necessary" (Jensen, 1974, p. 236). It is fortunate that Professor Jensen can look back with no regrets considering the shock waves in 1969. News of the article spread quickly beyond the Harvard Educational Review's 12,000 circulation and was picked up by the national press. Students picketed his office building at Berkeley and many demanded that he be fired. Jensen was also a bit perplexed that many people wrote scathing comments about his article without having read it, but he generally felt that the publicity was useful in that they "emphasized the importance of the issues" (Jensen, 1969a, p. 77).

The importance of the issues was magnified by his educational prescriptions based upon the evidence. Jensen had committed the penultimate crime of anachronistic heresy by linking scientific conclusions and educational policy. For

this blasphemy against current American trends Jensen paid dearly. He received "voluminous and often bizarre mail," he was alienated from former friends and colleagues, his classes and lectures were invaded, and at one point the Berkeley authorities assigned two plainclothes police officers as bodyguards to escort him to classes and to the parking lot when he left for home. He has kept records of all such events for a future study in social psychology (Jensen, 1974, p. 235).

Before surveying the reactions to Jensen's views and what, if anything, can be made of all the brouhaha, it would be appropriate to see just how Jensen developed his scientific disposition.

Oddly, Jensen became instantly famous for a publication in human behavior genetics when, by his own calculations, this category of psychological study accounted for only 10 percent of his published work; the least proportion of all the categories he lists.

Jensen feels his career "launched in London" while he was a postdoctoral fellow under Hans Eysenck at the Institute of Psychiatry at London's "old and famous" Maudsley Hospital. The majority of his subsequent work flowed from his two year experience in England, and Jensen considers this period the most important to him professionally. Also while in England, Jensen attended a special lecture which was to alter his outlook and consequently his career. It was the Walter Van Dyke

Bingham Memorial Lecture of May 21, 1957, sponsored by the American Psychological Association. The lecturer was Sir Cyril Burt and the subject was "The Inheritance of Mental Ability." Jensen was considerably impressed with Burt referring to him as "England's greatest and most famous psychologist" and deeming Burt's speech "probably the best lecture I have ever heard" (Jensen, 1974, p. 234).

Both Eysenck and Burt contributed their brand of science to Jensen. Eysenck lead him to the study of Thurstone's and Spearman's factor analysis which formed the methodological foundation for his theories on the nature of intelligence. Eysenck was also interested in the "heritability" of extraversion-introversion and carried out twin studies on the subject while Jensen was his understudy. At this time Eysenck's scientific approach centered around the hypothetico-deductive method made famous by American psychologist Clark Hull, although, certainly unlike Eysenck, Burt, or Jensen, Hull is considered a lineal descendent of Watsonian methodological behaviorism (Kendler & Spence, 1971, p. 2) and maintained a stricter adherence to logical positivism than would probably be found in the British tradition of psychology. However, a natural consequence of embracing Hull's deductive model was the adoption of a mathematical representation of theory, which remains Jensen's approach. Jensen describes the hypothetico-deductive method thusly:

> This means, in brief, that one proposes an explanatory postulate or set of postulates--call it theory--and then deduces from these basic postulates certain hypotheses concerning the empirical

> consequences that must arise under carefully specified conditions if the postulates are true and if the deductive logic is correct. Validation of the theory or the postulates, then, consists of subjecting the derived hypotheses or predictions to empirical, usually experimental, test...We cannot really prove any theory in science; we can only disprove theories. (Jensen, 1974, p. 211)

It was through this method that Jensen arrived at the "not unreasonable hypothesis that genetic factors are strongly implicated in the average Negro-white intelligence difference" (Jensen, 1969b, p. 82).

Burt's impressive lecture enticed Jensen to read all his other works and eventually to the "total world literature on the genetics of abilities" (Jensen, 1974, p. 234) and, thus, to that branch of genetics called population genetics or quantitative genetics. So, it was in his postdoctoral years that Jensen began the study of behavioral genetics, and it wasn't long after that he began to write articles about "genetic research on intelligence and its relevance to current problems in education" (Jensen, 1974, p. 234). All this lead Jensen in 1969 "to juxtapose the words 'race,' 'intelligence,' and 'genetics,' an act that was 'virtually taboo in academic circles'" (Jensen, 1974, p. 235).

Jensen's Mentors

The mentors, Eysenck and Burt, did not escape unscathed for the ideas and methods they exported via Jensen to the land of environmentalism. Eysenck entered the conflict on the nature side in 1971 with his book The I.Q. Argument: Race,

Intelligence, and Education. The basic tenets embraced by Eysenck have been outlined by Sandra Scarr.

> 1. I.Q. is a highly heritable characteristic in the United States white population and probably equally heritable in the U.S. black population.
>
> 2. On the average, blacks score considerably lower than whites on I.Q. tests.
>
> 3. United States blacks are probably a nonrandom, lower-I.Q. sample of native African populations.
>
> 4. The average I.Q. difference between blacks and whites probably represents important genetic differences between the races.
>
> 5. Drastic environmental changes will have to be made to improve the poor phenotypes that United States blacks now achieve. (Scarr-Salapetek, 1976, p. 115)

Eysenck provides an explanation of original causes for these postulates based in the natural selection of the evolutionary process:

> White slavers wanted dull beasts of burden, ready to work themselves to death on the plantations, and under those conditions intelligence would have been counterselective. Thus there is every reason to expect that the particular sub-sample of the Negro race which is constituted of American Negroes is not an unselected sample of Negroes, but has been selected throughout history according to criteria which would put the highly intelligent at a disadvantage. The inevitable outcome of such selection would of course be a gene pool lacking some of the genes making for higher intelligence. (Eysenck, 1971, p. 42)

Such doctrines and statements by Eysenck came in the wake of a preface in which he made such prudent statements as the following:

> whatever conclusions we may come to with respect to the hereditary contribution to the Negro's low I.Q., as compared with the white American's, this

> conclusion does not, and cannot, justify any argument in favor of segregation. Segregation on racial grounds is morally wrong and ethically unacceptable. (Eysenck, 1971, p. ii)

The incongruities demonstrated by these quotes prompted Sandra Scarr to label the work as "a maddeningly inconsistent book filled with contradictory caution and incaution" (Scarr-Salapatek, 1976, p. 117). Eysenck's apparent naivete in some matters of evolutionary genetics, i.e. selection pressure, validity of assumptions, and segregational load, brought him much criticism like Sandra Scarr's and did little to advance the cause he attempted to champion.

However, compared to the battering that the career of Sir Cyril Burt suffered, Hans Eysenck escaped the post 1969 nature-nurture battle relatively unharmed. Burt posthumously received the ultimate humiliation of having the legitimacy of his life's work questioned and, in many cases, denied. Jensen's debt to Burt has already been mentioned, and the fact that Jensen utilized much of his mentor's data in his own researches is an indication of the high regard in which Jensen held Burt. It was mentioned in the previous chapter that Burt has been called "the most brilliant social engineer of the early twentieth century" (Fincher, 1976, p. 171). He has also been called "the father of British educational psychology" (Gillie, 1977, p. 469). But more recently he has been called "a fraud" due to investigations of his work the results of which were held up for public view in America to the extent that the CBS news program 60 Minutes included a segment on the subject.

Burt was such an eminent figure that his work was accepted without question. The Wood report of 1929 in England incorporated his idea that retardation was inherited, an idea that was instrumental in implementing the segregation of retardates to prevent their reproduction. His work also had a direct bearing on England's 1944 Education Act which assured a multi-track system in that country by suggesting three types of schools--grammar, technical, and secondary modern--for those with different innate abilities. Burt was officially recognized by the government of England in 1946 when he was knighted (Gillie, 1977, p. 469). He was officially recognized in America in the year of his death (1971) by the American Psychological Association when they honored him with the Edward Lee Thorndike Award (Kamin, 1974, p. 35).

It is usually no easy task to identify causal relationships between historical events, though most works of a historical nature, including this one, imply them liberally. However, in the case of Cyril Burt, the vituperations cast upon a career that was nearly as old and entrenched as the discipline of psychology itself may never have occurred if not for Jensen's 1969 article. Burt would probably not have been surprised that his work eventually drew hostile attention. As early as 1955 he stated, "in psychology as in politics, the pendulum of fashion swings to and fro; and the vacillations roughly synchronize. During the nineteenth century, the associationists preached an egalitarian doctrine, and three reform bills were passed" (Kamin, 1974, p. 1). In historical

perspective, he died just moments before American associationistic-environmentalist-behaviorist "preachers" nearly excommunicated him.

The first indications of empirical wizardry on the part of Burt came from Leon Kamin when he chose to "retreat from a conditioning laboratory" (Kamin, 1974, p. vii) to consider the I.Q. question. Kamin's desire to consider I.Q. was related to Jensen, and his considerations lead to the book The Science and Politics of I.Q., mentioned in the previous chapter. The relationship to Jensen and the subsequent downfall of Burt can be seen in the following statement from Kamin's introduction:

> The plan of this book is first to review briefly the social history of I.Q. testing in America. Then we shall examine in detail the empirical evidence for the heritability of I.Q. That idea has in recent years enjoyed a remarkable resurgence in American academic circles. The work of Professor Arthur Jensen in summarizing past research has figured prominently in that resurgence. (Kamin, 1974, p. 3)

That Kamin is exceedingly capable at dissecting empirical research is clear to anyone who reads (and even partially understands) his book. He appears to be the type of researcher that one would rather have, as the political metaphor goes, inside the tent spitting out, than outside the tent spitting in when scientists begin choosing sides. His conclusions are first, "there exist no data which should lead a prudent man to accept the hypothesis that I.Q. test scores are in any degree heritable" (Kamin, 1974, p. 1). To Kamin the high heritability of I.Q. has been "prevailing wisdom," and he believes the

reason for this is related to "the way we think about it [I.Q.]" (Kamin, 1974, p. 2). It is his tenet that the I.Q. test in America was invented "by men committed to a particular social view," a view which "includes the belief that those on the bottom are genetically inferior victims of their own immutable defects" (Kamin, 1974, p. 2).

Kamin's examination of the empirical data cited by Jensen lead him to review Burt's work. Near the beginning of the section entitled "The Work of Cyril Burt" Kamin states the following:

> The fact is that the various papers published by Burt often contain mutually contradictory data, purportedly derived from the same study. These contradictions, however, are more than compensated for by some remarkable consistencies which occur repeatedly in his published works. (Kamin, 1974, pp. 35-36)

Kamin found contradictions in Burt's report on testing methods. For example, a 1943 study based on "crude test results" is referred to in 1956 but this time as based on "adjusted assessment." Kamin resents that "we are...explicitly told 13 years after the fact that the correlation reported in 1943 had <u>not</u> been based on 'crude' I.Q. test results, but on something called an 'adjusted assessment'" (Kamin, 1974, p. 36).

The remarkable consistencies alluded to by Kamin concern "no fewer than 20" instances of correlations remaining constant while the number of people in the sample changed" (Gillie, 1977, p. 469). For example, studies by Burt in 1955, 1958, and 1966 all reported correlations for monozygotic twins reared together of .771 although the sample sizes went from

21 in 1955 to "over 30" in 1958, and 53 in 1966. The same studies reported a correlation of .944 for monozygotic twins reared together, though the sample size ranged from 83 in 1955 to an unknown in 1958 and 95 in 1966. The chances of correlations remaining constant to three decimal places as sample size varies is, as Paul Ehrlich states, "roughly 1.0 divided by the number of electrons in the universe" (Ehrlich & Feldman, 1977, p. 110).

Kamin was not the only scientist to question Burt's work. At Hull University, Ann and Alan Clarke, both Ph.D. students of Burt's in the 1940's, began checking the consistency with which Burt's figures fit his favored theories. They found some miraculous fits. In a 1955 paper he produced observations which exactly matched the expected values of his model. He found that in a sample size of 1,000 children their I.Q. variance exceeded that of their parents. At that time Burt was the only researcher ever to obtain such a result. The Clarkes concluded that "scientifically, Burt's results are a fraud" and "he was obsessed with the importance of heredity as a major determinant of human differences" (Gillie, 1977, pp. 469-471).

Following these leads the London Sunday Times began to investigate Burt, but when they attempted to speak to his collaborators, Miss J. Conway and Miss Margaret Howard, there arose some doubt as to their existence. After attempting to track them through the universities and institutions to which they were supposedly attached, the conclusion was drawn that

"it must be considered a possiblity that Margaret Howard and J, Conway never existed, but were the fantasy of an aging professor who became increasingly lonely and deaf" (Gillie, 1977, p. 470).

All the charges were collated by Oliver Gillie and published in the London Sunday Times in October 27, 1976. Since that time Burt's work has had a shroud of doubt surrounding it.

It is not surprising that Jensen immediately came to the defense of the man he so much admired. He wrote a harsh rebuttal to the charges against Burt. His defense begins, "if the late Sir Cyril Burt, who died in his eighty-ninth year in 1971, were still living, he should easily win a libel suit against the London Sunday Times" (Jensen, 1977, p. 471).

Jensen had already published a critique of Burt's work in the 1974 Behavior Genetics, and he used this to support his arguments. He had pointed out 20 errors, ambiguities, or inconsistencies, and found them "trivial in nature" (Jensen, 1977, p. 471). He also held that "although the errors and inconsistencies may indicate carelessness, they show no evidence whatsoever of "fakery" or an attempt to bias the results" (Jensen, 1977, p. 471). He further pointed out that Miss Howard had already been positively identified "as a quite real flesh-and-blood person" (Jensen, 1977, p. 471).

To Jensen the controversy had gotten carried away. He states, "the desperate scorched earth style of criticism against genetics that we have come to know in this debate has finally gone the limit" (Jensen, 1977, p. 471).

The writer does not wish to express an opinion for either side in this case, for once such charges are brought to bear even acquittal does not free one from the taint. Arguing for Burt would do no good nor could anything be added for the other side. Burt has simply become a casualty of the war which rages on.

Level I and Level II Abilities

Jensen's work in learning inevitably lead him to his own theory concerning the nature of intelligence and learning abilities. This evolved from Jensen's research on disadvantaged children which included administering "direct learning tests," i.e. memory tests. He discovered that lower SES groups did as well as the higher SES groups on this type of test, yet he was aware of the difference in scores between social classes on I.Q. tests. Since I.Q. tests predict scholastic achievement equally well for all SES groups, he at first deduced the hypothesis that I.Q. tests and schooling were culturally biased. His subsequent research, however, caused him to reject this hypothesis in favor of a more genetically based theory.

Jensen feels that, since I.Q. tests measure a common factor called g, this g must require a different ability than direct learning tests which measure rote learning and memory. Therefore, he calls the abilities required by rote learning and memory Level I and those required by the g, i.e. conceptual or abstract learning, Level II (Jensen, 1974, pp. 224-

225). There seem to be some incongruities between the theories of intelligence of Jensen and Raymond Cattell. Level I is similar in description to Cattell's crystallized intelligence and Level II is likewise similar to fluid intelligence; the difference is that whereas Jensen believes I.Q. tests are a measure of Level II, Cattell believes his fluid intelligence can only be measured by "culture-free" tests and I.Q. tests measure crystallized intelligence, since I.Q. tests measure derived experience.

Jensen now feels that Level I and Level II abilities which "represent a very fundamental division of mental abilities" have "different genetic and physiological bases" (Jensen, 1974, p. 225). Jensen explains his present outlook in the following statement:

> I am now entertaining the hypothsized that the locus of Level I abilities is in the electro-chemical processes involved in short-term memory and the neural consolidation of memory traces. Level II abilities, on the other hand, are hypothetisized to depend upon the structural aspects of the brain--the number of neural elements and the complexity and organization of their potential interconnections. (Jensen, 1974, p. 225)

As proof of the genetic origin of Level I and Level II Jensen offers the following evidence:

> The experimental manipulation of task variables in laboratory experiments so as to either maximize or minimize the importance of Level II processes in performing the task leads me to the conclusion that the Level I-Level II distinction is not a matter of the culture-loading of the tests that measure each type of ability but of different kinds of mental processes required in the two classes of tests...Moreover, twin and sibling correlations and the estimates they yield of the heritability...

> of the best Level I and Level II tests give no indication of significantly lower heritability of Level II than of Level I tests. (Jensen, 1974, p. 226)

Jensen further believes that the reason Level I and Level II scores correlate and the distinction of each level differs in varying subpopulations (there is no difference in mean scores of Level I as a function of SES, but lower SES groups score lower on Level II than higher SES groups) can be attributed to assortative mating. There is also no functional or developmental relationship between Level I and Level II; in other words, Level II does not develop out of Level I, though Level I acts as a "scaffolding" for the development of Level II and then "falls away in importance as the Level II abilities are consolidated" (Jensen, 1974, p. 229). Jensen deduces this scaffolding effect from the wide range of correlations between Level I and Level II and the disordinal interaction when Level I is regressed upon Level II.

The Level I-Level II model of abilities has "important educational implications" if proven essentially correct. Children who have normal Level I ability but are below normal in Level II (these would mainly be Negroes and lower SES children) "might benefit educationally from curricula and instructional methods which made the acquisition of basic scholastic skills less dependent upon Level II abilities and more fully engage Level I abilities as a means of improving their educational attainments" (Jensen, 1974, pp. 231-232). That such educational policies would require a multi-track system which segregates children along racial and social lines

in the Terman tradition is obvious from Jensen's discussion of the nature of intelligence, and the methods to measure it have drawn further objection to Jensen's theories; jensenism is seen as a link to apartheid and inequality.

Jensen's Advocates

Although Jensen and jensenism are the central target for the discussion of scientific inegalitarianism in this work, it would be unfair to exclude at least a brief mention of two other scientists who share Jensen's views and have come to be closely identified with the hereditarian position in the recent controversy. They are Harvard psychologist Richard Herrnstein and electrical engineer and Nobel Laureate William Shockley, also a member of the National Academy of Sciences.

Herrnstein entered the argument in 1971 with his article "I.Q. in the Meritocracy" which appeared in Atlantic Monthly in September of that year. He later expanded the article into the book I.Q. in the Meritocracy. The major thesis of these works is represented in Herrnstein's now famous syllogism which first appeared in the Atlantic Monthly article:

1. If differences in mental abilities are inherited and
2. If success requires those abilities, and
3. If earnings and prestige depend on success,
4. Then social standing (which reflects earnings and prestige) will be based to some extent on inherited differences among people. (Herrnstein, 1971, pp. 58-59)

According to Herrnstein's social thesis, genetics determines "the haves and the have-nots"; a notorious status quo doctrine throughout history.

Like Jensen, Herrnstein drew a variety of criticism from such scholars as psychologist Noam Chomsky and psychologist Sandra Scarr. Herrnstein even entered into an exchange with Philip Green in the radical journal Dissent in which the debate took on a "socialist vs. meritocracy" tone and was argued on political and economic grounds. Green condemned the "pseudo-egalitarianism of the mythical free market" and Herrnstein contrarily denounced socialism for its "tendency towards egalitarianism [which] explains its recurrent lapses into anarchy at one extreme or bureaucratic totalitarianism at the other" (Herrnstein, 1977, pp. 297-306). Herrnstein has remained a devout supporter of what he feels to be a kind of necessary inequality yielded by a meritocratic democracy such as America's.

Shockley maintains a rather traditional hereditarian view. He holds that people are "color-coded" so that one can easily derive much of a person's worth through color classification (Ehrlich & Feldman, 1977, p. 3), an obvious reflection of Platonic "typing." Such color-coding has severe consequences when coupled with Shockley's attitudes toward I.Q. He has suggested in his article "Dysgenics, Geneticity, Raceology: A Challenge to the Intellectual Responsibility of Educators" that the lower a person's I.Q. the more that person should be encouraged to undergo

sterilization (Block & Dworkin, 1976, p. 413). Such an opinion places a tremendous responsibility on I.Q. as a measure of innate intelligence. That responsibility is now widely held to be misplaced--a fact we shall discuss in the next section.

The reader who wishes to further pursue the literature of Herrnstein and Shockley can find more information from some of the general works cited in the reference list. I chose not to include a more complete discussion of the two, because a diversion from Jensen and jensenism, in my opinion, would be superfluous.

The Range of Opposition

The literature spawned by the so-called "modern controversy" fathered by Jensen has been voluminous. So voluminous that it far exceeds the limitations of a single work to even scratch the surface of reactions from any given social or biological discipline. However, since 1969 most social science textbooks deal with Jensen's hereditarianism in a fashion appropriate to the discipline it represents. Therefore, for the sake of brevity and clarity I will attempt to present a textbook-style overview of Jensen's opposition, although there are some points vital to this work which must be regarded in greater detail. For the reader who may wish to delve deeper into the literature there are many generic books which provide a good starting point, for example, N.J. Block and Gerald Dworkin's The I.Q. Controversy and Ashley Montagu's Race and

I.Q. and Paul Ehrlich and Shirley Feldman's The Race Bomb. For the reader with some background in genetics or psychology an invaluable contribution to this subject is John Loehlin, Gardner Lindzey, and J.N. Spuhler's Race Differences in Intelligence. This final suggested reading, which will be drawn upon for this section, has the added attraction of having been presented to many of the important names associated with both positions in the controversy for their suggestions. It is comprehensive and technically informative.

Psychology and Education

Psychologists generally seem to attack jensenism along two lines. They either emphasize the statistical or sampling problems inherent in sorting genetic and environmental influences on human traits, or they question the instrument used to measure intelligence--the I.Q. test.

Jensen has provided an inventory of the criticisms aimed at I.Q. tests in regard to their cultural bias. Jensen's list includes the following:

1. The tests draw heavily upon specific middle-class cultural knowledge and linguistic knowledge and linguistic usage.

2. The implication is that blacks or other minorities in the U.S. do not share a common culture or background of verbal and cognitive experience which is sampled by the tests.

3. Similarity in test performance is a direct function of similarity in cultural background.

4. The biggest differences in I.Q. scores are between lower and middle social classes and between majority and minority racial groups.

> 5. Culturally biased tests may nevertheless show good predictive validity for predicting culturally biased criteria, like educational attainment and success in certain occupations. (Jensen, 1976, p. 340)

Before continuing, the article containing this information warrants some diverting comments. Jensen's purpose, of course, is not to promote these criticisms, but to dispel them. To do so he uses some rather sophisticated statistical acrobatics. Though these statistical operations are not new to testing and measurement, Jensen stacks one operation upon another to build a convincing case for the use of I.Q. He uses the mean I.Q. differences on the Wechsler Intelligence Scale for Children - Revised (WISC-R) to show the difference between blacks and whites, lower and middle classes, families (within race and social class), and within families (siblings). These data on 622 blacks and 622 whites, according to Jensen, prove that "the notion that I.Q. tests discriminate largely in terms of race and social class is just a myth" (Jensen, 1976, p. 340). The rationale for this is the fact that "I.Q. shows as much or more difference among children in the same family, sharing the same parents and cultural and linguistic background, as between racial or social class groups" (Jensen, 1976, p. 340). However, the footnote for this "proof" reports a partial correlation coefficient (a figure which represents the unique contribution of a variable holding the others constant) for race and SES of .3765 and .2797, respectively. By squaring the partial correlation coefficient we get the proportion (percentage) of variance explained by the variables

race and SES, and these values are, according to Jensen, .14 for race and .08 for SES. This means that race accounts for only 14 percent of the variance in this study and SES accounts for only 8 percent. In this sample, then, race and SES, though probably statistically significant predictors of I.Q. scores due to the degrees of freedom allowed by a large sample size, have relatively little practical significance as a predictor of I.Q.--unlike a heritability estimate ($\underline{h}^2$) of .81 or 81 percent of variance. This is a minor anomaly however, since it can be easily explained. A partial correlation is usually obtained by a "stepwise" regression procedure in which the total variance of a measure, in this case I.Q. scores, is obtained by determining what related variables uniquely contribute to it. If the variable in question is race, you first partition out all other variables, such as within family (sibling) and SES, and then determine what proportion of variance race accounts for above and beyond the other variables. Apparently, race as a predictor of I.Q. should not be confused with heritability estimates which reflect a racial difference. It often depends on which questions are asked as to which linear relationships are important.

His final and presumably most convincing proof of the unbiased nature of intelligence tests is based upon the ubiquitous g factor. According to Jensen, "an important criterion of the construct validity of any test (or test item) as a measure of intelligence is its loading on g when it is factor analyzed among other tests" (Jensen, 1976, p. 344).

Jensen carried out principal components analysis (the first principal component equals g) on separate racial groups as well as split half principal components analysis to determine the within group reliability across the subgroups. As a final step he correlated the g factor loadings between the groups--a correlation which was .98 (corrected for attenuation with the "usual formula"). All this may seem pretty impressive at first glance. Unfortunately factor analysis is only as impressive as the logic which underlies the procedure. At closer inspection the fact that g is the same underlying factor for blacks and whites in this case is not so surprising.

Construct validity deals with the question, are we measuring what we think we are measuring (in this case intelligence)? Since g is the traditional mathematical definition of intelligence to begin with, using it to empirically verify the hypothetical construct it represents seems redundant even for different subgroups and goes back to Boring's circular definition.

Another problem arises from the fact that Jensen utilizes that type of factor analysis called principal component analysis. This method is merely a means of transforming one set of variables into a composite set of principal components, the first of which Jensen equates with g. In this case g merely represents the best linear combination of variables to explain the total variance in the battery of tests, and any subsequent principal component is made orthogonal (uncorrelated or independent) from the first

(g) rather than oblique (correlated). The fact that the first linear combination for blacks and whites is correlated merely means that skin color is not an adequate variable to separate g. Previous authors have commented on the circular reasoning which can result from principal component analysis and Jensen may have fallen into such a trap. The SPSS manual quotes Rozeboom on this subject:

> If the data variables are to be analyzed as linear combinations of factors which are themselves, in turn, defined as composites of the data variables, aren't we just going in circles? Well, yes--in a way we are, but sometimes the view from one point on a circle is more interesting than from another. Complete analysis of a set of variables into defined factors is merely a linear transformation of the set, and a person's scores on such factors jointly contain exactly as much information about him, no more and no less, as do his scores on the original variables. But some ways to say the same thing are more illuminating than other ways..., and transformation of a set of data variables into a set of factors may very well reveal important relationships which are difficult to discern among the variables in their original form. In particular, extraction of factors economically exhibits the degree of linear dependence among the data variables. (Nie et al. 1975, p. 471)

In other words, the black-white test scores hold as much information as the principal component analysis, but in a different form. So Jensen provided an incomplete factor analysis (stopping with the first principal component) for black-white I.Q. scores which have a significant overlap of variance to begin with (meaning that oblique rotation would have yielded a clearer, more theoretically valuable picture). What this means is that Jensen is willing to attribute a difference in mean I.Q. scores of 15 points between blacks

and whites to genetic differences on the basis of heritability analyses of variance, but at the same time use linear transformations of those same scores which do not separate along color lines to support the contention that I.Q. tests are not culturally biased and have high construct validity. When one can look at two sides of the same coin and draw such varied conclusions, there must be some biased theoretical predisposition at work. Furthermore, Jensen's factor analysis is a very rough approximation of data, and he would have a more powerful tool if he carried the procedure as far as his scientific partisan Raymond Cattell. Fred Kerlinger and Elazar Pedhazur have acknowledged Cattell's pioneering work in the hypothesis-testing aspects of factor analysis in controlled experimentation (Kerlinger & Pedhazur, 1973, p. 364).

Those who have never been formally introduced to factor analysis may gain an approximate conceptual grasp from the following brief analogy. A major goal of any statistical tool of science is to reduce data to its most parsimonious form, or "to minimize mental effort" (Thurstone, 1947, p. 52). The criteria for judging whether or not an operation is scientifically valid is whether or not "the number of degrees of freedom of the construct is smaller than the number of degrees of freedom of the phenomena that the reduction is expected to subsume" (Thurstone, 1947, p. 52). The concept of degrees of freedom is important here. If one wished to describe a phenomenon one would gather data in the form of

observations. If the person took three observations but had to use the information from the three observations as three independent aspects of the description, then the number of degrees of freedom of the phenomena would be the same as the number of degrees of freedom of the description. However, if the person took 100 observations but could collapse these observations into three general descriptive categories then the operation was worth the effort. For example, if I wished to describe a person and took 100 separate observations of that person and then found that they would all fit into three categories of height, general appearance, and weight, it would be more parsimonious for me to categorize these observations in such a manner. By the same token, if I wished to describe the intelligence of a group I may give each person a 100 question exam. By factor analysis I may find that the group can be described with less effort according to general intelligence (g), math ability, and verbal ability.

What factor analysis does is to pack all the degrees of freedom into one big computerized shotgun shell and fire them into the data tree to see what clumps of variance fall out. Other statistical techniques are different in that they may aim at a specific point (point estimation in statistical talk) and fire one pellet at a time, continually homing in on the theoretically sound aspect of the data. Factor analysis is an all or nothing operation acting as a first approximation, which is why Thurstone dubs it an "exploratory" technique having "its principal usefulness at the border line of science" (Thurstone, 1947, p. 56).

Returning to the main line of discussion, it hasn't seemed to make much difference in psychology whether or not Jensen or others have come to the defense of the I.Q. test. The tests have been and are being increasingly criticized as a valid diagnostic tool in education. Jack Fincher's book Human Intelligence is based on this premise and in his words,

> Politics aside, the I.Q. test is increasingly criticized by the professionals themselves. Many now agree that a new test, a better test, a different kind of test--in the words of educator Robert Sears, 'a test to tell us what to test'--is badly needed if testing is to continue at all. (Fincher, 1976, p. 17)

Certainly today "the I.Q. tests are under fierce and growing fire on all fronts" (Fincher, 1976, p. 17). One can rarely pick up a professional journal or magazine today that doesn't have some condemnation of I.Q. testing lodged somewhere among the pages. To illustrate this point and to demonstrate the range of objections to the I.Q. test, I have chosen two articles from recent literature which express the need for a new approach to intelligence testing.

The first article appeared in the American Psychologist and is entitled "I.Q., Social Competence, and Evaluation of Early Childhood Intervention Programs" by Yale psychologists Edward Zigler and Penelope Trickett. The following is a quote from the abstract of that article.

> The importance of accurate outcome evaluation of programs with clearly defined goals is related to both the social science and policy-making arenas. The authors argue that social competence, rather than I.Q., should be the primary measure of success of intervention efforts....An index of social competence is suggested that includes

> measures of physical health, I.Q., school achievement, certain motivational and emotional variables, and such molar social expectancy variables as school attendance and incidence of juvenile delinquency. (Zigler & Trickett, 1978, p. 789)

In the body of the article the authors endeavor to explain how the I.Q. test became the most widely used outcome variable in intervention studies and why they feel it is inadequate for this purpose. The authors provide the following reasons as to how I.Q. tests became so popular as a measure of outcome: 1) the tests are well-developed instruments with well documented psychometric properties; 2) they are easy to administer; 3) they are strongly related to many other behaviors of theoretical and practical significance; and 4) an increase in I.Q. as a result of intervention is an impressive cost-effectiveness measure.

Contrary to the "theoretical godfathers" of early intervention programs, i.e. Hunt in Intelligence and Experience and Bloom in Stability and Change, these authors argue that the level of intellectual functioning is much more constant and the level of cognitive development much less plastic than early intervention programs implied. They have also gathered considerable empirical data concerning the capacity-performance distinction to support the contention that preschool intervention programs reflect motivational changes which in turn cause I.Q. scores to rise rather than a change in cognitive functioning. As a result they see I.Q. as "but one factor in a myriad of factors that determine the quality and character of human functioning" (Zigler & Trickett, 1978, p. 791). As

empirical evidence the authors cite the modest .20 correlation between childhood I.Q. and everyday performance in life in postschool years. If these authors are correct, it would change the face of Jensen's statement that "compensatory education has been tried and it apparently has failed" (Jensen, 1969b, p. 1).

The second example of recent attacks on I.Q. concerns Dr. Samuel Kohs who, as a graduate student under Lewis Terman in 1918, helped design the Stanford-Binet Intelligence Test. He later constructed the Kohs Block Test. But today Dr. Kohs is a retired professor writing a book damning I.Q. Kohs believes that I.Q. obfuscates the diversity of brain power. His repudiation of I.Q. is unequivocal:

> My basic quarrel with the I.Q. test is that it does not measure intelligence. What is this thing called intelligence? It has never been adequately defined. If we study monkeys, we measure monkey intelligence; dogs, dog intelligence. But what is human intelligence? Our tests focus on such narrow things, the ability to acquire knowledge. What of human feelings? What of social activities? Are not these also important? (I.Q. irrationality, 1979, p. 49)

He further feels that schools place too much faith in I.Q. scores, and children sometimes view the scores as measures of overall worth. Kohs sees genetic diversity as the fundamentally essential feature of human intelligence, as one can see from his description of his book in progress.

> The purpose of the book is to get people to recognize that there is such a thing as brain power. Nature doesn't produce duplicates--not duplicate pears or duplicate apples. Nature hates duplicates; it believes in variety. So, human beings, when they are born, are born

> with brain power but in different qualitative and quantitative varieties. (I.Q. irrationality, 1979, p. 49)

Attacks on the bastion of I.Q. have not been limited to those within the profession. The judiciary system has expedited the erosion of faith in the I.Q. test. In 1967 the District Court of Washington D.C. challenged homogeneous ability grouping and the basis upon which that tracking system was built. Shelly Wright, a U.S. circuit court judge, wrote the opinion of the Hobson v. Hansen case, and he issued firm warnings about multi-tracking in education. The court officially acknowledged a more insidious aspect of tracking on the basis of test performance--self-fulfilling prophecy, also known as the Pygmalion effect or the Rosenthal effect.

> The real tragedy of misjudgements about the disadvantaged student's abilities is, as described earlier, the liklihood that the student will act out that judgement and confirm it by achieving only at the expected level. Indeed it may be even worse than that, for there is strong evidence that performance in fact declines...a system that presumes to tell a student what his ability is and what he can successfully learn incurs an obligation to take account of the psychological damage that can come from such an encounter between the student and the school; and to be certain that it is in a position to decide whether the student's deficiencies are true, or only apparent. (Karier, 1976, p. 359)

This trend has continued. In 1971 the U.S. Supreme Court in Griggs v. Duke Power Co. ordered the power company to cease choosing janitors at their Dan River power station on the basis of standardized intelligence test scores. The intelligence tests were seen to have no bearing on the job requirements.

In the same year the Federal District Court in Chance and Mercado v. The Board of Examiners investigated the use of examinations in choosing applicants for supervisory positions. The court concluded that the test battery had no predictive or content validity in terms of the job requirements and ruled the tests unconstitutional (Hearing before the United States Commission on Civil Rights, 1972, pp. 352-353). In 1972 a U.S. District court in San Francisco enjoined the county schools from using I.Q. tests as the main criteria for assigning pupils to classes for the mentally retarded (Fincher, 1976, p. 218). Another case which has been bound in litigation since October 11, 1977, is Larry P. v. Riles in San Francisco which challenges the placement of six minority children in classes for the mentally retarded on the basis of I.Q. test scores. The attorney for the plaintiffs, Public Advocate member Armando Menocal III, holds that the genetic argument explains why 66.5 percent of the students in the special classes are "a socioeconomic shroud to the theories of Jensen" (Florida Times Union, Oct. 12, 1977, p. 11A). Both sides have called eminent psychologists as witnesses. By December 1977 there were already 2,000 pages of court transcripts accumulated in the case.

The debate over I.Q. continues to rage and I.Q. appears to be losing ground. In the April 1, 1979, issue of the Florida Times Union Milton Rockmore printed attitudes of scholars toward I.Q. tests in an article with the headline "Experts question value of I.Q. tests." Among the four contributing

scholars were Arthur Jensen and Richard Lewontin who have been opponents since the modern controversy began. Jensen was the only contributor who supported I.Q. tests and even he wrote, "they are valid but could be improved" (Rockmore, 1979, p. 4C).

With so much opposition I.Q. testing may be losing its fast hold on American society. In D.K. Buros' 1972 Mental Measurement Yearbook an epitaph printed about the Stanford-Binet Intelligence Test may apply to intelligence tests in general. "Its time is about over. Requiescat in pace" (Fincher, 1976, p. 218).

Regarding statistical sampling and other methodological considerations, psychologists have been quick to point out the inherent limitations of heritability estimates. Sandra Scarr emphasizes the problems in approaching the race question directly. According to her, direct comparisons of race require assumptions which prudent investigators hesitate to make. These include the following: all environmental differences are quantifiable, the environments for blacks and whites have an equal effect on I.Q., and environmental differences between groups can be statistically controlled (Scarr-Salepatek, 1976, p. 123). Other qualifications include first, the point that a heritability estimate of .80 does not imply that 80 percent of the variance in I.Q. scores is genetically "determined" or set at conception. This point has been fully discussed by Richard Lewontin. He points out that analysis of variance such as the heritability estimate merely describes

the distribution of environment and genotypes at the point in time when scores are obtained (Lewontin, 1976, p. 123). Second, heritability depends on the nature of the sample chosen for its calculation. Since heritability studies have generally centered on the white middle class population, it cannot be said that the black population has an $\underline{h}^2$ of .80. To illustrate that different heritability studies and samples may provide different results, note the following hypothetical situation. Assume that a researcher had access to three genetically identical people at the moment of birth. Now assume that the researcher randomly placed each subject in an environment randomly chosen from all possible environments and upon maturity gave all three an I.Q. test. Any differences in scores would be attributable to environment and heritability ($\underline{h}^2$) would have a tautalogous value of O.O. Obviously, if heritability is based on analysis of variance and only the environment in a study varied, all variance would be environmental. Conversely, if a researcher had access to individuals of random genetic composition and could nurture all three in an identical environment, any difference they displayed on any trait would have a heritability of 1.0. Even the most inexperienced reader can intuitively ascertain that human beings can grossly complicate the situation by not randomly breeding, by living in systematically chosen environments, by being related along various family lines, etc. To these complications add the notion that we are interested in the heritability of a trait that has amorphous features and is indirectly measured, and a proverbial Gordian Knot emerges.

Third, psychologists generally stress that even if heritability proved to be .80, attempts to improve cognitive ability through manipulation of the environment would not be futile. If the experiential aspects important to the development of intelligence could be discovered, we might effect a change in intellectual ability (CRM, 1975, p. 282).

Before moving to anthropological and genetic lines of argument, it is appropriate here to at least make mention of a movement which has recently arisen on the periphery of psychology and as a dernier cri casts aspersions on many aspects of Western psychology. I am referring to the split-brain or right-left hemisphere phenomenon. Since the discovery that the left hemisphere of the brain is the seat of rational linear functions such as reading, writing, and arithemetic and the right hemisphere is the seat of the intuitive functions such as three-dimensional vision, musical ability, and holistic reasoning, many authors have begun to question Western psychology's (and society's) left brain emphasis. In a recently popular book The Dragons of Eden: Speculations on the Evolution of Human Intelligence, Dr. Carl Sagan has provided an excellent review of this topic. The discovery of hemispheric differences in thinking patterns came about from the follow-up studies of patients who, for various reasons, i.e. operations for grand mal epilepsy, had had their corpus callosum (the bridge of nerves connecting the hemispheres) severed. Such patients showed some remarkable changes in their ability to process information. For example, "a right-handed split brain patient was able to copy simple representations of

three-dimensional figures accurately only with his (inexperienced) left hand" (Sagan, 1977, p. 171). This demonstrates the geometrical incompetence of the left hemisphere.

From such research it was concluded that the left hemisphere processes information in a sequential linear fashion, but the right processes several inputs simultaneously. This lead to the further conclusion that the left hemisphere is suppressed during dreams. Sagan repeats the famous story of German chemist Friedrich Kekule von Stradonitz's solution to the nature of the benzene molecule in 1865. The structure of benzene had eluded chemists. The structure of other simple organic molecules had been deduced and all had been linear arrangements. According to Kekule, while dozing on a tram he dreamed of dancing atoms in linear configurations when suddenly the two ends of the chain met forming what is now referred to as the benzene circle (Sagan, 1977, p. 179). Those acts of creation which occur in a dream state are seen to be right-hemisphere productions. One calls to mind the fateful dream of Rene Descartes in November of 1619. Upon subsequent contemplation Descartes reported that it seemed to him as if "the Spirit of Truth opened to his gaze the treasure of all the sciences, wherein the human mind played no part, and revealed to the philosopher the foundations of the admirable Science (mirabilis scientia fundamenta)" (Matson, 1964, pp. 5-6). The right hemisphere is apparently a remarkable force.

The left brain linearity of Western psychology has fallen under some criticism as a result of hemisphere studies. There

has been some criticism of developmental models like Jean Piaget's additive linear model of cognitive development. In light of the split-brain phenomenon, Piaget's model is seen as too left-brain oriented, since it views cognitive development in terms of a hierarchy which is linear in nature. If Jean Piaget's theory, a bulwark in modern educational theory, has come under attack on these grounds, it is no surprise that I.Q. tests have also been attacked on the grounds that they measure only left brain functions. As Sagan states about the Stanford-Binet I.Q. Test, "there is certainly little room on such examinations for testing intuitive leaps" (Sagan, 1977, p. 184). It is only a slight extension of these criticisms to attack the statistical theories underlying intelligence (and other forms of) testing. Statistical concepts and methods in the social sciences, i.e. correlation, factor analysis (g), and regression, can deal only in linear relationships. For example, factor analysis merely rotates linear axes in data space.

Given the implicit limitations of heritability studies as emphasized by educational psychologists in the United States, behavioral genetics has not seriously threatened to overshadow those theories such as behaviorism which stress environmental contingencies rather than genetic constitution. This is not to say that contemporary educational theories could not be enhanced by the conscientious use of quantitative genetics. This is an idea to be dealt with in the final section of this work.

Cultural Anthropology

Cultural anthropologists interested in the jensenist controversy must utilize theories from both psychology and genetics, though geneticists and anthropologists sometimes disagree on human taxonomy methods. The following statements from J. Baker demonstrate the vested interest of anthropologists in the problem.

> No one who has not taken the trouble to study these (intelligence) tests in sufficient detail to recognize their possibilities and limitations is qualified to express an opinion on the ethnic problem. There is, perhaps, no aspect of this problem more deserving of serious study by anthropologists than the systematic testing of cognitive ability. (Baker, 1974, p. 438)

> The high esteem in which geneticists are rightly held may lead astray some of those who have not made a careful study of the anatomical basis of human taxonomy. If ever the polygene problem is solved, anatomists and geneticists are likely to find themselves no longer in disagreement. (Baker, 1974, p. 458)

Anthropologists then split the seam between psychological measurement and genetics while establishing their own parameters of investigation.

The most exclusively anthropological condemnation of nativist theories deals with the concept of racial taxonomy. As early as 1937, Jacques Barzun, writing on scientific anthropology, stated,

> Race-theories alter their jargon, change their ulterior motives, and mix their claims, but they cannot obliterate the initial vice of desiring to explain much by little and to connect in the life of the group or the individual some simple fact with some great significance. (Barzun, 1937, p. 158).

Most modern anthropologists consider racial taxonomy on the basis of such nineteenth century criteria as skin color or facial features as absurd. Even genetics cannot make clear distinctions outside limited population groupings according to blood serum. The following paragraph sums up the anthropological attitude toward racial taxonomy:

> With the discovery in the postwar years of many more genes which varied in their frequencies in the populations of the world, it was thought that the solution to the problem of race was near at hand...But increases in knowledge did not seem to solve the problem, but only to confound it. For each new gene, a new set of races was discovered, and thus the amount of human genetic variability which could not be explained in terms of the usually accepted races increased enormously. The situation became discouraging; so much so that a recent reappraisal of the value of these newer blood group and hemoglobin genes for taxonomic purposes has labeled them worthless. This means that their distributions are not related to the morphological characteristics by which races are usually constructed. But this does not mean that the genes are worthless; the racial classifications are. (Livingstone, 1964, p. 63)

Put another way, "genetics has gradually made the ineptitude of typological approaches evident to increasing majorities of anthropologists" (Dobzhansky, 1973, p. 64).

Anthropologist Alexander Alland has attacked racial theory on the grounds of two general principles of universal scientific approach: 1) the null hypothesis and 2) Occam's razor.

According to Alland, the null hypothesis is based on the law of entropy (the universe tends to chaos), and is based on the fact that "it is impossible to prove that some kind of relationship does not exist between variables" (Alland, 1971, p. 169). The null hypothesis is a statement of equality that is accepted until proven false, but it can never be proven true. The racial question stated as the null hypothesis is: "there is no relationship between phenomenon A (race) and phenomenon B (intelligence)" (Alland, 1971, p. 169). Those who believe otherwise must present evidence to reject the null. In this manner one "can turn the question around and demand that racists offer convincing proof that the hypothetical relationship does in fact exist.... Intelligence is at the very least a complicated concept hidden behind simple definitions" (Alland, 1971, p. 170).

Occam's razor states that if two explanations adequately explain a phenomenon and both remain within the bounds of logical and empirical proof, the simpler of the two must be accepted. Alland believes that to explain the rise and fall of civilizations on the grounds of fluctuations in gene frequencies violates Occam's razor when the more parsimonious explanation is that the general flow of ideas stimulates creativity which is eventually played out. Furthermore, "the assumption that national character is immutable and tied to the genetic history of a population leads to strange political theories indeed" (Alland, 1971, p. 173).

Alland also cites a 1968 study by Sherwood and Natanpsky in which the scientific disposition on the racial-intelligence

question was shown to be statistically related to the background of the scholar. Biographical data were obtained for 104 scientists who had contributed scholarly articles on intelligence research. The background of the scholars was found to be a statistically significant predictor of stance on the nature-nurture question.

> Those whose grandparents were foreign-born tended to see no differences between whites and Negroes while those whose grandparents were American by birth indicated definite findings of innate inferiority in Negroes. Those whose parents had low mean years of education saw environment as a crucial factor in test responses. Individuals from rural backgrounds were more likely than those whose origin was in urban centers to find indications of biological differences. (Alland, 1971, p. 207)

These statistical results are no more far fetched than some genetic interpretations.

Quantitative Genetics

Certainly the most profound but recondite analyses of the modern controversy were penned by scientists who employ quantitative genetics as a tool of their trade. N.E. Morton has expressed the value of population genetics in the I.Q. controversy.

> Although the value of genetic studies on racial differences is at best academic, I think a population geneticist has some responsibility to avoid puristic aloofness, lest geneticists conclude that hereditary differences have been proved (or disproved) by psychologists, and psychologists suppose that they have been proved or disproved by geneticists. A minimum standard for the evidence is that it bears the scrutiny of population genetics. (Morton, 1974, p. 326)

Once again, due to the prodigious amount of literature from this area, for the most part the discussion will be kept at a general level and will include general theory in quantitative genetics and evolutionary theory. However, some in-depth discussion is necessary to clarify theoretical positions.

In order to be forthright and unequivocable about the direction and purpose of this section, the author initiates the section with the following quote by Theodosius Dobzhansky:

> As with biological mathematics generally, the results of even the most precise and elaborate calculations do no more than give numerical expressions of the biological assumptions put at the base of the mathematical model. (Dobzhansky, 1973, p. 56)

The point expressed here is that no mathematical models now in use have the capabilities to provide a definitive answer to the modern nature-nurture controversy. The territory is divided into those on the nature side, though Dobzhansky asserts that extreme nativist theories are "not espoused by any reputable scientist" (Dobzhansky, 1973, p. 20) and those on the nurture side, which has in recent history included most social scientists. However, in population genetics the decision to place oneself on one side or the other is derived from the very core of population genetics theory. Most laymen would surely find these theoretical underpinnings baffling and many social scientists consider them arcane. But these basic postulations are essential for a better understanding of the issues, and, with the invaluable aid of references from such leviathans of the field as Richard C. Lewontin, Sewall Wright, Theodosius Dobzhansky and Eliot Spiess, an attempt will be made here to illuminate the necessities.

Population genetics is seen as a vital tool in the study of the evolution of man. Its mathematical models have much to say "about changes or stability of the frequencies of genes in populations partly or wholly isolated from each other [yet] it has contributed little to our understanding of speciation and nothing to our understanding of extinction" (Lewontin, 1974, p. 12). Population genetics can be seen simply as a sort of auditing device for evolution. One can take periodic readings of the distribution of phenotypes in a population and then, using mathematical transformation laws which consider such factors as mating, migration, and natural selection, describe genotypes, and predict the genotypic arrays for the next generation. In other words, the laws of transformation provided by population genetics help to determine the position, direction, and velocity of the evolutionary process (another criticism of Jensen et al. is that they are merely taking a measurement (I.Q.) frozen in time and thus drawing conclusions as frozen in time as the measurements).

Unfortunately the operations described above are not quotidian tasks which are accomplished without incident. There are complications within these operations without which there may be less grounds for a nature-nurture controversy at the scientific level. These complications fall under the following three headings and will be discussed individually: 1) the epistomological paradox, 2) the "classical" vs. the "balance" hyothesis, and 3) stochastic vs. deterministic processes in evolution.

The epistomological paradox arises out of the divided theoretical emphases between Mendelian genetics and biometrics, a topic discussed historically in chapter IV. The laws of population genetics are not framed exclusively in terms of both genotypes and phenotypic variables. Lewontin expresses the paradox thusly:

> One body of theory, what we might call the "Mendelian" corpus, used almost exclusively by those interested in the genetics of natural populations, seems to be framed entirely in genetic terms. The other theoretical system, the "biometric", used almost exclusively in plant and animal breeding, appears to be framed in completely phenotypic terms. (Lewontin, 1974, p. 13)

In other words, the Mendelian theory attempts to account for changes in allele (genes paired at the same locus on an homologous chromosome) frequency across generations as a function of present frequency and mean fitness (selection value) of the genotypes. Fitness or the chance of genes being chosen to reproduce is a product of pherotype (beauty in our society, for example). In the biometric model, on the other hand, the attempt is made to predict changes in phenotype across generations in terms of intrapopulation phenotype (the difference between parental or subgroup phenotype and the population as a whole), the phenotypic variance of the trait in a population, additive genetic variance, and the heritability of the trait. However, heritability and the genetic and phenotypic variance are a function of the genetic variability in the population. Therefore, the phenotypic law is empty without an accurate description of the genetic

variables. No sufficient description of the transition between generations is possible in terms of phenotype alone (Lewontin, 1974, pp. 13-15). Lewontin expresses the effects of the paradox by saying, "what we can measure is by definition uninteresting and what we are interested in is by definition unmeasurable" (Lewontin, 1974, p. 23).

What this means for the I.Q. controversy is that the question of whether genes or environment contributes the most to intelligence remains unanswerable. The Mendelian system is designed to explain the change in phenotype when one allele is substituted for another. Yet due to the tremendous overlap of phenotypic variation it is often impossible to distinguish one group from another on behavioral traits. As Lewontin says:

> Indeed, for most of the characters whose change the evolutionist wishes to explain, the variation between genetically identical individuals is likely to be of the same or greater magnitude than the variation introduced by a single allelic substitution at one of the loci affecting the character. Even if the heritability of I.Q. in Caucasians is 80 percent, as is estimated by some studies..., the effect of a single gene substitution on I.Q. is small (except for drastic abnormalities giving rise to mental deficients) as compared with environmental variations. If this were not the case, the Mendelian inheritance of I.Q. would have been worked out long ago. (Lewontin, 1974, p. 22)

In other words, I.Q. is not a discrete genotypic variable which separates along obvious lines like the tall or short pea plants in Mendel's original experiments. It is virtually continuous in its phenotypic distribution with a myriad of factors influencing its genotypes and phenotypic characteristics. These factors hopelessly complicate heritability studies.

The salience of stochastic vs. deterministic processes of evolution in relation to racial studies has been lucidly outlined by Dobzhansky.

Deterministic processes are those which are subject to selection pressure and, thus, comprise the Darwinian evolutionary system based on natural selection. As the term natural selection implies the adaptability of the organism determines its survival in the given environment; therefore, any racial differences arising by selection are the result of adaptation to environmental circumstances. This is not necessarily the case with stochastic processes. Other names for stochastic processes are random genetic drift, random walk, non-Darwinian evolution, and the Sewall Wright principle. These terms refer to evolutionary processes which have neutral fitness. In other words, changes in gene frequencies occur which are not the result of selection pressure. For example, American society generally practices strict monogamy, but there are variations in the number of children per family. Sewall Wright was the first to hypothesize that these variations could, over time, alter gene frequencies. Dobzhansky points out that some authors, primarily nongeneticists, have sought to explain the origins of differences between individuals and groups to which they could not readily attribute survival value. Race differences in man fall in this category although Dobzhansky has dubbed this a heuristic error (Dobzhansky, 1973, pp. 78-79).

Although there are arguments advanced for the formation of races in this way, Dobzhansky emphasizes the lack of reliable data and that probably both forces were at work. Those who accept the strictly stochastic explanation of racial origin see races as randomly "fixed" and not subject to further selection pressure. Those inferior races remain forever inferior. Proof for one side or another in this question is practically impossible, since one would have to know the genetically effective population size over several generations to assess fixation. Such Malthusian disruptions as war, plague, epidemics, etc. are prohibitive (Dobzhansky, 1973, p. 82).

The classical vs. the balance hypothesis has profound implications in the I.Q. controversy. One's opinion of man's genetic potentiality can be a product of one or the other of these hypotheses.

No one adheres to either hypothesis in its extreme form. The two views revolve around the question, at what proportion of its loci would a diploid genotype be heterozygous? The tendency to either extreme Dobzhansky dubbed the classical and balance hypotheses.

The classical school in its extreme form holds that an individual is homozygous for a "wild-type" gene at nearly every locus. The term "wild-type" simply means normally occurring in the population. Furthermore, each individual is heterozygous for rare deleterious alleles at an occasional

locus, and some are severely handicapped by homozygosity for rare deleterious alleles which can be passed on by inbreeding.

The balance school, on the other hand, assumes that individuals are generally heterozygous at all loci except a rare locus resulting from inbreeding. As a result, there are technically no wild-type genes in the diploid state, but, more importantly for the issue at hand, the number of segregating alleles in the population is enormous yielding a vast richness of genetic diversity.

The choice of hypotheses precipitates further consequences which Lewontin has clearly outlined.

> If the classical hypothesis were correct, the difference between populations would be of far more profound significance than under the balance theory. Since there would be so little genetic variation between individuals within populations, most of the genetic diversity within a polymorphic species would be interpopulational. In man, the manifest genetic differences between geographical races would represent a much greater proportion of total human variation than occurs within races, giving race a considerable biological importance. A basis for racism may also flow from the concept of wild type, since if there is a genetic type of the species, those who fail to correspond to it must be less than perfect. Platonic notions of type are likely to intrude themselves from one domain into another. (Lewontin, 1974, pp. 25-26)

H.J. Muller is the founder of the classical school and it is from this pessimistic outlook of perpetual homozygosity that he derives his attitudes about man's "genetic twilight" which was discussed in an earlier chapter. The main founder of the balance school is Dobzhansky, and until his recent death he condemned the classical school and preached a philosophy which viewed evolutionary changes as "a re-patterning of the gene pool of the population" (Spiess, 1977, p. 594).

It could be that choosing a position on the classical-balance dichotomy is one of the most meaningful existential choices left to social scientists. From this choice come other responsibilities. To uphold the balance theory is to view the evolutionary process of man as a rich wellspring of new and diverse genetic material with each individual being a new source of hope. To choose the classical theory is to believe, as Muller says, that "the gene through the long course of evolution has finally found itself in man" (Lewontin, 1974, p. 30). This leaves only an evolutionary process which has seen its culmination in a stagnant gene pool that can only deepen into an acheronian quagmire of genetic misfits unless scientists intervene with programs designed to control the course of evolution.

The choice is also to view the individual as the central feature of evolution rather than a population, which yields a political dichotomy between liberalism and conservatism. At his ninety-fifth birthday party Roger Baldwin, founder of the ACLU and legal engineer-behind-the-scenes of the famous Scopes Monkey Trial (which allowed Darwinian theory to be taught in public schools) made the statement that "traveling hopefully is better than arriving." Those who look upon man as the end product of evolution and wish only to manipulate populations on the basis of assumed genotypic characteristics have arrived. Those who view man's inequalities as redeemable through whatever processes are necessary to insure the individual a right to an equal chance for "life, liberty and the pursuit of

happiness" are still traveling hopefully. Human equality does not rely on genetic equality nor should the science of genetics be condemned to protect the human condition. Dobzhansky has pointed out a frequent misinterpretation regarding equality and genetics.

> Defenders of equality become entangled in the same snare [as discreditors of equality] when they attempt to minimize or deny human genetic diversity. They overlook, or fail to understand, that the diversity is an observable fact of nature, while equality is an ethical commandment. (Dobzhansky, 1973, p. 4)

It is for reasons such as these that in the introduction to this work it was pointed out that reactions to Jensen were often an act of self-vindication or for the wrong reasons. Jensen is merely a scientist, and a good one, who is clinging to his own theoretical origins for which there is support in his data. However, if we are to become what Ivan Illich terms "Epimethean men" we, especially the teachers of the young, must not react blindly to theories like jensenism. We must react logically. To this theme we shall return in the final section.

The balance theory causes further problems with the concept of race which would upset jensenist contentions. Advances in molecular genetics have provided imposing evidence to support the existence of rich genetic variability more in line with the balance theory (Lewontin, 1974, p. 152) and this evidence has implications regarding the traditional means of separating races still used by social scientists. We have conventionally assumed genetic homogeneity within

races based on obvious differences such as skin color and hair form, the history of which was discussed in a previous chapter. Our continuation in this practice has been sustained by the socio-political and economic end which this method serves. However, "when we examine allele frequencies at randomly chosen loci, we get a rather different picture" (Lewontin, 1974, p. 153). It has been empirically demonstrated from gene frequency data for protein and blood group loci that genetic variation between those groups labeled Caucasoids, Negroids, and Mongoloids is slight compared to the variation within each group and a substantial proportion of heterozygosity exists at these loci (Nei & Roychoudhury, 1974, p. 435). There is an average of 85 percent of human genetic diversity within national populations and no reordering on the basis of linguistic, morphological, or genetic criteria significantly alters this percentage (Lewontin, 1974, p. 155).

This kind of evidence has lead members of the balance school to a more responsible view of race differences. They do not go so far as to deny the existence of race. As Dobzhansky has said, "to hold that because races are not rigidly fixed units they do not exist is a throwback to typological thinking of the most misleading kind" (Dobzhansky, 1973, p. 72). Rather it is the injustice bred by conventional race separation that suffers. Lewontin summarizes the incongruities of past racial distinctions as the basis of the classical hypothesis:

> The taxonomic division of the human species into races places a completely disproportionate emphasis on a very small fraction of the total of human diversity. That scientists as well as nonscientists nevertheless continue to emphasize these genetically minor differences and find new "scientific" justifications for doing so is an indication of the power of socioeconomically based ideology over the supposed objectivity of knowledge.
>
> Indeed the whole history of the problem of genetic variation is a vivid illustration of the role that deeply imbedded ideological assumptions play in determining scientific "truth" and the direction of scientific inquiry...The classical hypothesis has been developed in extended form, feeding upon, digesting, assimilating, and waxing fat on the very facts that were meant to give it fatal indigestion. (Lewontin, 1974, pp. 156-157)

The theoretical conundrums discussed so far are more general problems of evolutionary genetics--a concern far beyond the consideration of the kind of social theory that is a reflection of more myopic interests. For example, when Arthur Jensen states that "schools must also be able to find ways of utilizing other strengths in children whose major strength is not of the cognitive variety" (Jensen, 1969a, p. 117), the responsible teacher or school administrator or curriculum designer should analyze such a suggestion in light of sound genetic theory. Knowing that g is unequally distributed among racial and SES groups and that to follow Jensen's suggestion is to maintain segregation along racial and social class lines, the decision to act upon jensenist theory is one which must be weighed carefully. If the environment is more important than Jensen and others would have us believe, then homogenous grouping will not allow the environment to have an equalizing effect. If on the other hand genes do play an important role but the balance hypothesis is correct, then all

the selection pressure of segregation will be meaningless in stabilizing I.Q. in the long run. Dr. Eliot Spiess has lucidly expressed these "likely flaws" in the arguments of Jensen and Herrnstein in his population genetics textbook:

> Jensen relied heavily on data supplied by Burt taken from the relatively uniform English population. Of course, we cannot legitimately extrapolate from that population to other populations, especially to our highly heterogenous one in the United States. The heritability value emphasized by Jensen and also utilized by Herrnstein was high (about 0.80)--a value that certainly includes many components contributed by nonadditive genetic effects and nonrandom mating, leaving only about half the total (40 percent) available to respond to Herrnstein's proposed selection for social level. We know that the "additive" variance component may well have a dominant and epistatic component when allelic frequencies are not equal at all loci, and we do not have the faintest idea of the nature of the genotype that determines I.Q. Therefore, the heritability could easily move to zero with slight change in allelic frequencies if much of the determination is from overdominant (heterotic) loci. To make Herrnstein's provision for change in genotype with mobility between social classes, it is necessary to propose that the additivity measured will produce a good response to selection forces. We do not know whether high I.Q. results from homozygotic concentration of positive alleles, from high levels of heterozygosity, or from special genetic combinations, both epistatic and overdominant. If the high-I.Q. genotype is a highly heterozygous "balanced" one, all the selection one could muster in an all-out eugenics program would never create a permanent, uniformly stable (homozygous) high-I.Q. genotype. Segregation for lower I.Q. (or different mental abilities if we speak more generally) would always continue. At the other end of the scale, segregation for higher I.Q. from low-mentality parents would probably occur. When genetic variation is <u>unfixable</u>, selection may bring about a quick plateau at a not very high level. No doubt that process has already taken place over the past five or ten generations in our society. If a major fraction of human genotypes acting on mental traits can be attributed to heterozygosity, it would be very hazardous to predict the outcome of selection

> purely from parent-offspring heritability estimates. Realized selection progress is often much less than that predicted. (Spiess, 1977, p. 227)

Dr. Spiess' statements provide a natural bridge between the deeper theoretical issues of population genetics and the more specific mechanics of heritability estimates. Therefore, let us look at these specific problems concerning the mathematical model perpetuated by Jensen. It was mentioned earlier that there is a distinction between heritability in the broad sense and heritability in the narrow sense. Narrow sense heritability is the ratio of additive genetic variance to total phenotypic variance. Broad sense heritability is usually calculated simply by the split monozygotic twin correlation if environment is assumed to be uncorrelated. This value gives $\underline{h}^2$ and $1-\underline{h}^2$ in the upper limit of the environmental influence since with separated MZ twins, only the environment fluctuates (Layzer, 1974, p. 1262). The reader is reminded here that a correlation is a strictly linear mathematical function and both broad and narrow sense heritability calculations are based on the concept of correlation. However, there are factors in the genetic model making up $\underline{h}^2$ which complicate things. In the 1969 article Jensen mentioned mathematical variance components for covariance of heredity and environment, epistasis (interaction among genes at two or more loci), assortative mating, and dominance deviations. These are all valid genetic considerations, the calculation of which do not pose a serious problem in animal breeding. However, the complexity of human social

relationships make the application of quantitative genetic techniques to humans more difficult. Human beings do not randomly mate so there is the complication of assortative mating. Normally this would be no problem. In I.Q. studies, one can utilize the correlation in I.Q. between husband and wife to make the proper adjustment (Kamin, 1974, p. 87). However, assortative mating in the presence of dominance is a different matter. Sewall Wright has expressed the mathematical dilemma presented by this combination of factors.

> Other complications arise if there is assortative mating or selection of parents. It was noted that these could be obviated by using the regression of offspring on midparent as the measure of heritability, if it could be assumed that gene effects are additive and not complicated by environmental effects. With dominance in any degree this regression is not linear and thus is affected by selections of parents. Assortative mating introduces a correlation between dominance deviations of parents and offspring and between dominance deviations of either and additive deviations of the other. Accurate deduction of heritability thus becomes practically impossible if there is appreciable assortative mating in the presence of dominance. (Wright, 1968, p. 441)

Wright's cautionary statement concerns the sorting out of additive genetic effects which is generally a concern of narrow heritability estimations. Jensen and his cohorts are concerned with broad heritability estimates, i.e. correlations between separated monozygotic twins if environments can be assumed to be random. However, the statistical tools used to assess such relationships are not designed to handle the non-lineartiy described by Wright.

Kamin has developed a sequential description of Burt's model which reveals how the the confounding problems of environment, dominance, and assortative mating are nefariously overcome (Kamin, 1974, pp. 87-88). Both Jensen and Herrnstein reprinted Burt's theoretical values for kinship correlations as if these values "spring full-blown out of iron genetic laws" (Kamin, 1974, p. 95).

To obtain an estimate of assortative mating the phenotypic I.Q. correlation between husband and wife is used. But estimating dominance and environment is a more complex process. In principle the effect of assortative mating would be to increase the correlations for parent-child and siblings, since like tends to marry and reproduce with like. The effects of dominance and random environmental fluctuations should be to reduce these correlations, since dominance reflects heterozygosity or overdominance at the highest level, thus increasing diversity (therefore covariance) and environment is, obviously, a nongenetic effect. Furthermore, there is no proven way to accurately estimate the level of dominance which exists for I.Q. or of knowing what the practical and theoretical effects of random environments are. Burt's model uses the empirical parent-child and sibling correlations to estimate dominance and environmental effects, respectively. Kamin here precisely describes the sleight-of-hand made by the model:

> The failure of the empirical parent-child correlation to be as high as would have been predicted solely on the basis of assortative mating provides an indication of the joint effects of dominance and environment. The

> random effects of environment are assumed to be the same for all kinship categories, but on Mendelian grounds it can be shown that dominance if present does not reduce the sib correlation as much as it reduces the parent-child correlation. Thus the model can now use the empirical sib correlation, compared to the empirical parent-child correlation to separate the hypothetical effect of dominance from that of environment. This procedure has the following consequences. The hypothetical effects of dominance and of environment are "traded off" against each other. For a given degree of assortative mating, dominance can play a major role only if the random effects of environment are relatively small, and vice versa. (Kamin, 1974, p. 88)

The model will be unpredictably influenced by sampling fluctuations and the type of correlation used. For these reasons Kamin concludes that "the model can be no better than the caliber of the empirical correlations from which the 'theoretical values' have been deduced" (Kamin, 1974, p. 88) and "the aura of numbers surrounding much work on I.Q. heritability is in large measure specious" (Kamin, 1974, p. 95).

The problem of additivity or linearity involves only one of the assumptions underlying the prestigious analysis of variance model for separating races according to differing traits. Jerry Hirsch, one of Jensen's most persistent antagonists over the years, has attacked the use of the analysis of variance model on the grounds that once the data are made to fit the model, discrepancies between measures of central tendency for different groups are allocated a genetic rationale. In the same issue of Science in which the famous Erlenmeyer-Kimling and Jarvik graph was first printed was an article by Hirsch which was unfortunately overshadowed by the 30,000 correlation pairs. In the article Hirsch discusses

race differences in relation to the assumptions and inherent properties of the anlaysis of variance model.

> Races are populations that differ in gene frequencies. Observations on populations are summarized in distributions, so often assumed to be normal. When we add the assumption of common variance, or make transformations to obtain it, the data fit into the ever popular analysis-of-variance models. The difference between two populations must then be a difference between means, because the assumptions of normality and homogeneity of variance for the model leave no other property with respect to which the distributions can differ...any individual from the population with the higher mean is better than any individual in the other population.
>
> Distributions have other properties, such as dispersion, skewness, and kurtosis (peakedness), and no single one is exclusively important. Where these other properties have been examined, the inadequacy of a preoccupation with the central tendency and a hasty assumption of normality has been easy to document. There is no reason to expect two populations with different environments to have precisely the same distributions for any trait. (Hirsch, 1963, p. 1441)

Therefore, the assumptions of analysis of variance may often be falsely imposed on data sets. Hirsch and Jensen have crossed swords over the I.Q. controversy on several occasions during the past ten years, and their verbal exchanges have not always been of a sophisticated scientific nature. Hirsch has equated "jensenism" with "white supremacy" and Jensen has labeled Hirsch's attacks as "slurs, smears, and innuendos" (Journal of Educational Research, June 1972, pp. 15-16). Like many other aspects of the I.Q. controversy, the Jensen-Hirsch confrontations accentuate the emotionalism which seems to hover at the fringe of the scientific queries.

I mentioned previously that it would be practically impossible to collate and present all the material surrounding the modern controversy. Therefore, to finalize this section I have chosen to present a summary of empirical findings by Loehlin, Lindzey, and Spuhler which they put forth after two hundred pages of reviewing the literature concerning the controversy in their book Race Differences in Intelligence. These authors have a list of twenty conclusions covering a wide range of nature-nurture studies. This list is here paraphrased.

They conclude that there are shortcomings in the design, execution, and reporting of racial-ethnic studies and that authors have been unduly biased by their own political and social preferences. Heritability studies of I.Q. have asserted that both genotype and environment account for variation in intelligence, though genotype accounts for more interaction and correlation between genes and environment plays a small role. Many heritability estimates based on within-family data, i.e. twin studies, are lower than commonly reported estimates due to sampling limitations. Estimates based on between-family data, i.e. sibling correlations, are inconsistent, some being lower for blacks than whites and usually in conjunction with lower overall variance in the black groups, suggesting the involvement of a decrease in between-family differences.

Studies of racial mixture yield the following conclusions: first, the correlation between I.Q. and skin color or other

similar anthropometric measures are positive but low and can be reconciled by either a genetic or an environmental interpretation. Second, there was seen to be no correlation between intelligence and blood-group genes likely to be of European origin in a small U.S. black sample. This is consistent with an environmental interpretation. Another study of high-I.Q. black children found no increase in European admixture. This is evidence against a difference in genetic potential for intelligence between African and European ancestors of present-day U.S. blacks. Studies of offspring of black-white marriages show that offspring with white mothers have higher I.Q.'s than those with black mothers, implying a maternal environmental effect. A study of the offspring of occupation forces in post-World War II Germany and one of Great Britain residential nurseries found no overall I.Q. differences between mixed-race and white children.

There have also been comparisons among socioeconomic and racial-ethnic groups. Although racial-ethnic differences and socioeconomic differences are correlated, they are distinct enough to require separate treatment. Theoretically, differences in the former result from natural selection and genetic drift, while differences in the latter are more the product of assortative mating and social mobility. I.Q. correlates in SES are generally the same in U.S. minority and majority groups. Average racial-ethnic group differences are not particularly responsive to environmental improvements in social level. Racial-ethnic group differences and SES

differences on intelligence tests are minimal during the first two years, but become substantial in the third and fourth year. Stimulating environments can cause an improvement in I.Q. score, but it is not clear just which changes are effective, and upward changes have not endured in some studies. There exist in the data differences in patterns of ability between U.S. racial-ethnic groups, i.e. stronger verbal than non-verbal performance among U.S. blacks, and although there is evidence that these are independent of SES, it is unclear whether other cultural factors or genetic factors are responsible. The preponderance of the variance in both patterns and levels of ability is within U.S. racial-ethnic and socioeconomic groups, not between them.

Regarding studies on nutritional differences, there is evidence that malnutrition in prenatal and early life can be detrimental to brain and cognitive development. Data indicate that U.S. blacks are generally less well nourished than U.S. whites, though severe malnutrition is rare in any ethnic group in the U.S. Though evidence is inconsistent it remains possible that nutritional improvements in minorities, especially pregnant mothers, may reduce existing group differences in I.Q. (Loehlin, Lindzey, & Spuhler, 1975, pp. 232-236).

Out of all the evidence assimilated and examined by Loehlin, Lindzey, and Spuhler they can justify drawing only a few weakly stated conclusions. Weakly stated according to them because "the state of the scientific evidence" can bear no stronger ones. These conclusions are the following:

> 1. Observed average differences in the scores of members of different U.S. racial-ethnic groups on intellectual-ability tests probably reflect in part inadequacies and biases in the tests themselves, in part differences in environmental conditions among the groups, and in part genetic differences among the groups. It should be emphasized that these three factors are not necessarily independent and may interact.
>
> 2. A rather wide range of positions concerning the relative weight to be given these three factors can reasonably be taken on the basis of current evidence, and a sensible person's position might well differ for different abilities, for different groups, and for different tests.
>
> 3. Regardless of the position taken on the relative importance of these three factors, it seems clear that the differences among individuals within racial-ethnic (and socioeconomic) groups greatly exceed in magnitude the average differences between such groups. (Loehlin, Lindzey, & Spuhler, 1975, pp. 238-239)

Although a complete survey of the literature in this area is, of course, impossible due to its prohibitive and awesome volume, I hope that which has been provided gives the reader a sufficiently pellucid representation of a cryptic issue which has for centuries eluded a denoument. Due to the complexity of the theoretical foundations involved, the controversy has remained a wellspring of ideology. Perhaps this sentiment can be epitomized in the following statement:

> The rationale for theoretical debates stems from defense and criticism of theories. But on such issues as the heredity vs. environment question, social, political, and personal views are invested in the arguments. Such heavy investments make the resolution or reconciliation between the positions even more unlikely. And an unrecognized by-product of such a debate is likely to be a strong suggestion of the mutual exclusiveness of causal sources. (Griffore, 1978, p. 184)

As a consequence "jensenism" has become a causal source representing an ideology which has been a sustaining force in the nature-nurture dialectic. Jensen was another vehicle for the "ism" of this causal source which has long been established. We could precede the "ism" with a list of such names as Galton, Pearson, Burt, Herrnstein or many others from any period since the Golden Age of Pericles and the ideology remains the same, though the methods of inquiry have varied. The attacks on Jensen, personal and professional, have generally been superfluous and of a spurious nature. In this chapter I have endeavored to present only cogent, efficacious criticism, as well as illuminate some of the more esoteric facets of the modern debate. The moment Jensen's 1969 article became widely publicized and the term jensenism was coined, he was swept up in a maelstrom which far exceeded his expectations and his capability to resolve the overwhelming criticism on all fronts.

The Contribution of Jensen

Regardless of any methodological flaws inherent in Jensen's work, he and his supporters have made what may soon be viewed as a valid positive contribution to the social sciences. We have been awakened to the fact that, like it or not, genetics plays a role in human affairs. That we find it difficult to separate nature-nurture from ethical questions is no fault of Jensen's. In the 1980's if we show a little common sense we may be writing about environmental

and genetic contributions to man's social situation without courting vehement reaction.

One prominent psychologist who in the past was an antagonist of Jensen, but who now has begun writing about nurture and nature is APA journal editor Sandra Scarr. In April 1979 she wrote in conjunction with Richard Weinberg, "each generation of scientists rediscovers the nature-nurture problem. In our day we were taught environmentalism gone amok. It was inevitable that the pendulum would swing far back toward biology" (Scarr & Weinberg, 1978, p. 29). This statement is historically familiar, and Scarr and Weinberg go on to describe their research, saying,

> Our data show the importance of experience on the development of human behavior, and dispel racist notions of genetic differences in the abilities of blacks and whites. But our studies also demonstrate the unmistakable contribution of genetic factors to individual differences in intellectual ability, interests and even prejudices. (Scarr & Weinberg, 1978, p. 29)

Scarr and Weinberg are unequivocal in their realistic approach at the risk of causing an outrage. But they also try to remake the point which must seem like whipping a dead horse to some, while others seem never to have known the horse was alive.

> Many people think that genetic studies automatically suggest conservative social policy; if everyone is born smart or stupid, there is no reason to change the educational system.
>
> It is true that some politicans and laymen use evidence of heritability to justify the status quo. It is no longer God, but "instincts" or "genes" that glue us to our roles and make sweeping social change impossible. At the other extreme some political systems (such as the Soviet Union and

> the Peoples' Republic of China) deny genetic heritability altogether, maintaining that the state creates and changes human nature. Economics giveth, and economics taketh away.
>
> We think that both of these extreme political interpretations of scientific research on heritability miss the point. Social policy should be determined by political and ethical values. Justice has nothing to do with genetics, and the latter cannot be summoned to excuse fascism or to deny a group fair play. (Scarr & Weinberg, 1978, p. 36)

Under the suppositions delimitated by Scarr and Weinberg and others, scientists attempt to free themselves from the pressures of emotional reactions that words like "heritability" and "genetics" set off. Our historical perspective does not display much optimism that scientists will ever be able to operate without the emotionalism. But even with the perils of blaspheming against environmentalism social scientists are beginning to operate in the area of behavioral genetics. If the proper perspective can be maintained we may be on the verge of a reconciliation of nature and nurture and a melding of previously "mutually exclusive causal sources."

A discussion of the entire field of social science in its relation to the I.Q. controversy is beyond the scope of this work. However, it would be fitting to mention one movement which has recently emerged from the modern controversy, and although it has generated some debate, most of the pros and cons have been of a highly responsible nature. The main purpose in introducing this movement, which was dubbed "sociobiology" by its main proponent, Edward O. Wilson, is that it is a genetically based theory which has been billed

as an alternative to jensenism. A secondary purpose for the introduction is simply to provide an example of a product of the modern controversy which may be an indication of the softening of hardline environmentalism and a leading indicator of the direction of future social science. And thirdly, sociobiology is a social science which is more firmly rooted in evolutionary theory than is jensenism as well as many of the so-called learning theories.

Sociobiology had its beginning in 1975 when Harvard professor Edward O. Wilson published Sociobiology: the New Synthesis. Wilson attempted to establish the place of mankind in relation to the rest of the animal kingdom. Inexorably he was attacked by radical scientists for introducing "just another, more sophisticated form of Social Darwinism... another attempt to demonstrate that the present social order is natural, inevitable, and unchangeable" (Leakey & Lewin, 1977, p. 33).

While it is true that sociobiological theory like Social Darwinism is concerned with general social behavior evolving through a selection process, it is firmly rooted in modern evolutionary genetics. To dismiss it out of hand is somewhat irresponsible. Edward Wilson expresses the following concern over the criticism:

> The critical response to human sociobiology was unexpected in two respects. The outer meaning is the literal argument...that "genetic determinism" of any kind will inevitably be used to justify reactionary political doctrines, racism, sexism, aggression, and other undesirable social responses associated with acceptance of the status quo. The

> deeper meaning, in my opinion, was the challenge they sensed to their own authority as natural scientists devoted to the study of social problems. (Wilson, 1978, p. xiii)

Wilson expresses a desire that "scholars in the social sciences and humanities...acquire expertise in sociobiology and apply it to the analysis of human behavior; then the judgement of human sociobiology could be made" (Wilson, 1978, p. xiii). Unfortunately in the nature-nurture controversy this is rarely the order of things.

What is sociobiology? Its roots are in the evolutionary theory of men like Darwin, J.B.S. Haldane, and Sewall Wright. Arthur Caplan states that,

> it is the theoretical models of kin selection, with their emphasis on coefficients of genetic relationships, population size, isolating factors, the genetic mediation of traits and behaviors, and the notion of selection acting upon sets of genetically similar subpopulations of organisms" that is the essence of sociobiological theory. (Caplan, 1978, p. 7)

But it is not just a repetition of population genetics, evolutionary or ethological theory. Sociobiologists have made more extensive claims regarding human behavior. It is argued that sociobiology should be utilized to explain universal human behavior patterns. Furthermore, it is asserted that sociobiological models are a necessary supplement to the other social sciences in their effort to understand human nature even to the point of allowing sociobiology to set the parameters of epistomology. According to Arthur Caplan, these sweeping certitudes have lead some to wonder at the presumptuous tone of sociobiologists. Wonderment which inevitably settles into

atavistic argumentation. Some of the objections brought up are identical to those brought against Jensen. Critics bring reference to genocide and Nazi Germany, Francis Galton and Platonic "typing"--on the proponent's side there is support via Marx, Mendel, Neo-Darwinism, and fruit flies. And perhaps it is an indication of the changing times, but the sparring seems either perfunctory by those who feel obliged to comment, or of a nature that is likely to disseminate valid scientific theory.

It is not the purpose here to recommend sociobiology as the answer to the nature-nurture controversy. I still maintain there is at present no answer; but the aura of combat surrounding sociobiology is indicative of the next cycle of the nature-nurture pendulum. If approached with candor perhaps the two sides can find some common ground upon which to strive for the common good, even though historically the bickering has only perpetuated injustice.

Proponents of sociobiology have expressed this sort of optimism on Jensen's home ground--educational theory. J.B. Biggs wrote an article in 1978 which cast sociobiology as an alternative to jensenist educational programs. Biggs cited Kamin's refutation of Jensen's quantitative model and put forth a sociobiological model which stressed the genetic basis of qualitative learning processes that he felt "leads to models of educating that are quite different from, and more optimistic about, the role of schooling than models derived from a genetic abilities-based theory" (Biggs, 1978, p. 17). Biggs asserts

that in an ever progressing species like man, the school plays the role of learning catalyst for those processes for which we do not yet have complete evolutionary preparedness. For example, man has been orally communicating far longer than through the written word. Therefore, speech has more evolutionary preparedness than reading or writing and schooling can aid the biological adaptation of the latter. And, according to Biggs, "teaching may be defined as an intervention that changes environmental conditions in order to compensate for organismic unpreparedness, so that learning may proceed" (Biggs, 1978, p. 13). Such considerations would supercede racist theories which place little hope in equating subpopulations through school as an evolutionary catalyst.

Of course, the optimism of the sociobiologists is not shared by all. Alper, Beckwith, and Miller state that "one of the areas where, in the past, biological determinist theories have had their most immediate impact is education. This has been no less true for sociobiology" (Alper, Beckwith, & Miller, 1978, p. 479). These authors relegate sociobiology to a position of all other "deterministic" theories like jensenism. At least in the case of sociobiology the reaction has sometimes been overdone but a public upheaval has not occurred even though the spectre of racism has maintained its affiliation with genetic determinism.

Wilson has admitted that sociobiology has been a "first amateur's approach" (Wilson, 1978, p. xiii) at exploring sociality, and if it is allowed to develop along with other

evolutionary based theories of human behavior we may be witness to another historical shift in the nature-nurture emphasis, for which jensensim will be greatly responsible.

Perhaps a tolerance and eventually an appreciation of evolutionary and population genetics and their applications to behavior can occur when social scientists (and the public) gain a better understanding of the inherent theoretical options available. One is not automatically locked into racism, eugenics, the fixity of intelligence, etc. for entertaining the idea that evolutionary theory and population genetics may be useful tools to increase our understanding of human behavior including that class of behavior we deem intelligent.

CHAPTER VII
FROM THE PROMETHEAN LEGACY TO A NEW OPTIMISM

When in disgrace with fortune and men's eyes
I all alone beweep my outcast state,
And trouble deaf heaven with my bootless cries,
And look upon myself and curse my fate,
Wishing me like to one more rich in hope...

William Shakespeare
in "Sonnet XXIX"

"Nowhere is there a classless society free of prejudice and in which the laws of supply and demand operate in an even-handed way" (Samuelson, 1973, p. 788). Thus writes celebrated economist Paul Samuelson in his popular economics textbook. Throughout modern history economic theories have been applied to the analysis of inequality arising from the competition of goods in the world marketplace. Thomas Malthus, an early force in modern economic theory, has been called the father of scientific racism for his famous treatise of 1826, Essay on the Principle of Population. In this essay Malthus put forth the thesis that poverty was advantageous to society for weeding out the poor--a theme overlapping Spencer's "survival of the fittest" half a century later. Of course, modern economists do not recommend inequality as a viable social force, they merely wield the tools that can describe the degree and causal sources of inequality. A question which concerns us today is how can we overcome the inequalities inherent in our modern industrial capitalistic society? And of special interest

to social scientists in general is the question of whether or not the concepts of education, genes, intelligence, evolution, etc. can be treated in conjunction with one another without perpetuating inequality?

It is impossible to deny that economics plays a key role in shaping social attitudes. There is generally an inverse relationship between the economic situation and social consciousness. As the economy slows down, economics takes a more stringent grip on social attitudes confining socioeconomic latitude within ever narrowing parameters. And, conversely, as John Kenneth Galbraith expresses, "when people generally experience improved economic well-being, there is a similar and general loosening of the grip of economics on their social attitudes...no longer does the fact that one person gets more than he needs mean that someone else gets less than enough" (Galbraith, 1971, p. 16). When the economic situation is such that certain people <u>are</u> getting more than they need <u>at the expense of others</u>, who are invariably members of certain subpopulations, it is convenient to fall back on atavistic genetic theories to explain the inequities, thus relieving the consciences of the few and setting off another cycle of political reaction. This explains how a 123 page article in a seemingly specialized journal can be seized upon by the few and attacked by the masses for uses far exceeding its original intent; simultaneously seized upon and attacked by the haves and the have-nots in a janusian contradiction erupting from the emotional, not the scientific, atmosphere. One side

claims they are the haves by merit of their intellect while the other claims they have no intellect because they are not the haves.

The question then arises, how do we resolve the conflict? In 1919 Henry H. Goddard phrased the central issue and the key question, although the infamous Dr. Goddard intended the question to be purely rhetorical.

> ...The fact is, (a) workman may have a ten intelligence while you have a twenty. To demand of him such a home as you enjoy is as absurd as to insist that every laborer should receive a graduate fellowship. How can there be such a thing as social equality with this wide range of mental capacity? (Bowles & Gintis, 1976, p. 104)

For modern man the sanguine answer, the social equalizer was thought to be universal, compulsory education. And indeed to some extent education has been "the socialism that subverted the ancient order of privilege" although there is some criticism that money invested in higher education actually subsidizes the middle class rather than the poor (Samuelson, 1973, p. 807). Those compulsory education programs that Jensen called failures were investments in social equalization. The idea was to give everyone an equal starting place so that individual merit, not racial or social background would carry him forward. Bowles and Gintis state that "the halting contribution of U.S. education to equality and full human development appears intimately related to the nature of the economic structures into which the schools must integrate each new generation of youth" (Bowles & Gintis, 1976, p. 53).

The most convenient way we have found of maintaining cost accountability for subsidized educational programs is by measuring net gain in I.Q. before and after a program. I.Q. correlates with educational achievement which in turn correlates with earning power in our economic structure. These are all easily measurable "physical traits" if we accept our traditional outlook on the supremacy of empirical measures. However, there are alternative possibilities to established methods. Different results may emerge if we question assumptions and methods in light of our historical blunders.

On the economic scene Galbraith has recommended a change of attitudes. He feels that we have placed an unwarranted emphasis on employment and growth, which he feels may be the result of inequality in the first place. He feels that "the primary prescription must henceforth be for the improvement of what may broadly be called the quality of life. This should now be the primary goal" (Galbraith, 1971, p. 24). This, according to Galbraith, may help fill a gap between the public and private sectors, because our modern industry has come to demand its own type of worker, a characteristic of whom is certain educational abilities--abilities which preclude some categories of people from participation in the mainstream of our present economic structure. Therefore, Galbraith claims, "it comes about that the remedy for unemployment and individual privation depends to a very considerable degree on the balance between public and private services--or, more generally,

on measures to improve the quality of life" (Galbraith, 1971, p. 26). It has also come about that the primary institutional mechanism for improving the quality of life is our educational system.

There are more radical economists and sociologists, however, who argue that racism is inextricably rooted in our American institutions and will remain with us as long as these institutions do. They argue against neoclassical economic analysts who optimistically hold that we can eliminate racism within the framework of our already existing institutions. As one radical economist states:

> Racism is viewed as rooted in the economic system and not in "exogenously determined" attitudes. Historically, the American Empire was founded on the racist extermination of American Indians, was financed in large part by profits from slavery, and was extended by a string of interventions, beginning with the Mexican War of the 1840's, which have been at least partly justified by white supremacist ideology. (Reich, 1976, p. 225)

We cannot deny that these events occurred and that they had some form of scientific rationale to justify them at the time. But we also cannot deny that we have made great strides in alleviating racial strife over the past few decades. It is my premise that we do not have to become Bakuninites or even Marxists to turn the course of our previous history. However, we do need some attitudinal alterations and a bit of reeducation to awaken our concern and willingness to accept the changes that would accompany attempts at socioeconomic equalization.

Economists have established that irrational racism hurts not only the black man but the white man as well. In our capitalistic competitive economy if a capable individual cannot receive good training and thus remains unqualified, or if a qualified individual is turned down for extraneous reasons it forces our economy to drop away from the competitive equilibrium because of poor utilization of factors of production (Kiltgaard, 1976, p. 9). If we accept the "not unreasonable hypothesis" that we can benefit everyone by rejecting racist ends and that anarchy is untenable there is yet another direction in which to go. But it is a path we each must create for ourselves just as we have created racism. It involves a dedication to a long run optimism regarding the evolution of man. Since there is a general need to base this optimism in scientific rationale, then there are options at the very core of genetic theory to serve this purpose adequately. It is somewhat distressing that such a rationale is necessary in order to secure the promotion of individual worth, but this seems to have always been the case in Western society.

Social scientists generally seem to grasp at a presumably sound scientific theory from a discipline anchored in measurements of a more directly observable nature and then create for all of us metaphors to explain, predict and control specific action patterns in social behavior. What is needed to aid modern education in its quest for equal opportunity is a new metaphor based in the more optimistic aspects of

genetic theory. This metaphor should be based on sound theory, or as sound as we can judge theory to be, given the present state of technology, and it must also represent hope for the future of man. It must also be able to encompass all major branches of the social sciences. Then, in addition to these requirements, it must represent a learned approach and be a source of courage for teachers, administrators, students, parents--for every citizen.

Modern education desperately needs some source of strength to bind individuals in a hopeful journey through generations to come. Education as an institution is presently suffering through a period of decline and is sustaining critical injuries at the hands of a dissatisfied and often disinterested public. It has been said that each person is a universe in himself and requires personal theories (Calder, 1976, p. 135). Some seeds of theory can spontaneously become planted in the public and can run amok if left untended. Jensenism may be just such a theory. It has arisen during a time of impending exigency for education.

America's economy has begun to grind down. The danger to education has already become apparent. When New York City was threatened with bankruptcy, President Ford committed the federal government to support that city's "essential services." These services included police, fire and garbage collection--but not education. Education is no longer viewed as a necessary economic risk (Hechinger, 1979, p. 20). Stagflation and a crippling energy crisis have resulted in a political shift

from the liberalism of the 1960's to a neo-conservatism at the threshold of the 1980's. The effect on education has been devastating. One author has assessed the situation as follows:

> Still reeling from the 1960's assault by the new left, the schools are now the favorite punching bag of the new right. The changes proposed by those two opposite forces would both have the effect of undermining the schools, even though the political motivations for doing so differ. Both would like to scuttle compulsory education.
>
> As criticism mounts, old sources of support for the schools have begun to dissipate. The years of guilt and atonement sparked by the civil-rights battles of the early 1960's, and intensified by the assassinations of John F. Kennedy, Robert Kennedy, and Martin Luther King, have come to an end. The middle class, feeling disadvantaged and neglected, has come to resent expenditures for the children of the poor, which were at the heart of the Great Society's compensatory education movement. (Hechinger, 1979, p. 20)

Add to this bleak appraisal the fact that public school enrollment has begun it decline from the post World War II baby boom, the "back to basics" movement, and the growing popularity of Proposition 13 type legislature, and American education seems to be drifting down the Acheron without a paddle. Unless something is done to restore the public faith in education and its potential as a viable cohesive force in society, there may be a grim denouement forthcoming. F.M. Hechinger believes that "at stake is the difference between a fluid and a stratified society" (Hechinger, 1979, p. 22). This would mean that all our past follies would yield no rewarding lessons.

> Without a renaissance of educational populism, the pseudopopulists of Proposition 13 will squeeze the vitality out of public education, ultimately

> leaving the United States with two educational strata, rigidly divided along lines of class and wealth. At the end of that road is the graveyard of the American dream. (Hechinger, 1979, p. 22)

If there is an optimistic chord to be struck we need new hope based in solid scientific theory.

Educational theory is a social science, but one which fluctuates with changes in all other social sciences. And "the social sciences (in general) deal with judgements and moral or legal laws, subject to personal and popular opinion and political opposition" (Szasz, 1976, p. 176). Because of the nature of social science, the most productive social theories are those that can moor themselves securely within the framework of the so-called "harder" sciences. The reason for this has been made explicit by Thomas Szasz.

> The natural scientist is...a literal scientist: he is an explorer and creator of new facts, relationships, and territories. Whereas the social scientist is a metaphorical scientist: he is an explorer and creator of a new language; he is a poet whose poetry about himself and others is mistaken for prose about "human nature." (Szasz, 1976, p. 177)

Because of this all the mathematical models in existence cannot ultimately solve a riddle such as nature-nurture and I.Q., as long as the term intelligence remains a hypothetical construct. It was to avoid such academic quagmires as this that psychologists like B.F. Skinner abandoned the introspection and phenomenology of earlier psychology and created non-mediational models which adhere to strict logical positivism. And regardless of charges that it may create an Orwellian nightmare, methodological behaviorism has enjoyed

tremendous popularity over the past few decades precisely because it has restricted its parameters to logical positivism and accepts no covertly gathered data; its progress is easily measurable in terms of cost accountability.

However, because of the imminent socio-political ramifications of the nature-nurture controversy and the obvious role of genetics and evolution in the perpetuation of our species, we must have some social scientific metaphor, or "poetry," anchored in optimistic genetic theory if education as an institution is to fight the acheronian current and remain with the world of the living. Today educators can ill afford to take refuge behind mathematical models or logical positivism. If individuals could be programmed to a life of exogenously controlled behavior and if the majority wished society to operate on such mechanics, the nature-nurture controversy would not exist. Likewise, nature-nurture would not be an issue if we were convinced that the educational system can adequately process individuals strictly according to individual or group genetic propensity. Neither position has been satisfactory.

The fact is it has been asserted that our modern curriculum is still permeated with Aryan myths from the American eugenics era. Steven Selden has recently written on this subject and is highly critical of the legacy of Francis Galton, G. Stanley Hall, Edward L. Thorndike, J. Howard McGregor, and other bastions of racist educational psychology. As recently at 1975 Selden found textbooks which list studies

relating to the racial background of gifted subjects. Regarding the role of the social sciences in the design and implementation of curricula, Selden warns of the extreme danger of eugenic myths.

> The eugenics movement was too closely aligned with racism, exclusionism, conservative political beliefs, and nativism in general not to bear close examination when it becomes associated with education. (Selden, 1978, p. 80)

He goes on to assert that "it is the nature of myths that they are not destroyed, but are used for the creation of a new universe" (Selden, 1978, p. 80). Because of this Selden prescribes that "as students of curriculum, let us keep separate our metaphors and myths; separate so that we might understand the former and do battle with the latter" (Selden, 1978, p. 81).

However, Selden contends that "to the degree that social science is seen as a cultural rather than a biological science, man may be seen as a creator than as created" (Selden, 1978, p. 80). I believe that until we can establish our metaphors in relation to the biological sciences, we will continue to perpetuate past follies. The idea of man as creator may have already set menacing institutional traps in which to snare man and make him prisoner of his own creations. With a little intelligent retrospective thinking we may be able to put forth some more enchanting metaphorical ideals.

During the course of my research I came across a fascinating, propitious metaphor constructed by the brilliant

educational disestablishmentarian Ivan Illich. Although I do not have the radical fortitude to recommend "deschooling society," I found his metaphor of optimism to be a perfect match for the more optimistic genetic theories such as Dobzhansky's balance hypothesis. It seems that if I am to recommend a change of attitude, the responsibility should fall on me to come up with at least one alternative. This effort I make here, and though it probably will not be the apotheosis, I believe it to be a step in the right direction.

In a previous chapter I quoted Roger Baldwin as saying that "travelling hopefully is better than arriving," and we saw that a balanced theory of genetic evolution centers around the diversity of a population's genetic material as a more hopeful outlook for the future of humankind. It is a rationale for hope or a poetry of optimism that we presently need.

Ivan Illich believes that man has ensnared himself in what he terms the "Promethean fallacy" (Illich, 1971, p. 164). Illich depicts the story of modern man as an allegory of the tale the classical Greeks told of Prometheus and his brother Epimetheus. Prometheus (also known as "forethought") was exceedingly adroit and managed to steal the knowledge of fire from the gods. For this treachery Zeus ordered his son Hephaestus (the lame god of fire know as Vulcan by the Romans) to fashion a woman from clay and send her to earth to marry Prometheus. Zeus gave her a beautiful amphora containing all the ills of earth. Prometheus was not deceived and refused her. However, against the warning of Prometheus, Epimetheus

(also known as "afterthought" or "hindsight") married Pandora. In order to mete out some punishment on Prometheus, Zeus had him chained to a rock on Mount Caucasus (and if we attribute any meaning to Blumenbach's racial taxonomy, Prometheus was in good company). Pandora eventually opened the box and ills of the ages were freed, but she closed the lid before hope (the only representative of good) could escape. Illich's analysis begins with the degradation of the myth of Pandora. The Greeks moved from a prehistoric matriarchal society to a misogynous patriarchal society so that by the time Hesiod retold the story of Pandora in the Classical period they panicked at the thought of the first woman.

From this point Prometheus, the giver of fire and the ability to work with iron, became the god of technology, and man throughout history has been engaged in the Promethean endeavor of forging institutions to bind and restrain the rampant ills which roam the earth. The connotation of "forethought" has become one of expectation and to Illich "afterthought," which meant "dull" or "dumb" to Classical Greeks, represents the fading hope of mankind. "The Promethean ethos has now eclipsed hope. Survival of the human race depends on its rediscovery as a social force" (Illich, 1971, p. 152).

Man has created and engineered institutions to ensnare social ills and to create the world in his image. However, in creating his own environment man has had to constantly reshape himself to fit in it. He has allowed expectation to

devour hope and has woven his own self-fulfilling prophecies into his institutions. We have borrowed the legend of Pygmalion to represent this in education. Learning has become no more than a consumption of preordained subject matter. We have been insidiously drawn into our own trap. Accordingly, Illich is critical of present day education.

> School has become the planned process which tools man for a planned world, the principal tool to trap man in man's trap. (Illich, 1971, p. 159)

> Education which makes you need the product is included in the price of the product. School is the advertising agency which makes you believe that you need the society as it is. (Illich, 1971, p. 163)

What is needed now is an emerging awareness that we are becoming bound to our institutions, and their inability to distribute goods and services with some degree of equality is largely a product of the inherent self-fulfilling prophecies which we ourselves perpetuate with our own Promethean ideals. "Hopeful trust and classical irony must conspire to expose the Promethean fallacy" (Illich, 1971, p. 165).

As a symbol of hopeful man Illich has suggested a name for "those who value hope above expectations...for those who love people more than products, those who believe that

> No people are uninteresting.
> Their fate is like the chronicle of planets.
>
> Nothing in them is not particular,
> and planet is dissimilar from planet.
> (Illich, 1971, pp. 166-167)

Illich suggests we give a name to those who can cooperate with their Promethean brother but utilize his tools to care for and tend to others. These men shall be called "Epimethean men" (Illich, 1971, p. 167).

To accept the Epimethean ethos is to restore a rightful place for hope as a force in man's future. It is infinitely more hopeful to believe in the rich diversity of mankind and the uniqueness of the individual than in the preordained categorization according to prophecies that have long exhausted their appropriateness. Inasmuch as the epistomological foundations of our exalted empirical evidence allows a choice in the matter, to what fruitful end could the less hopeful journey lead? Why is it any more correct to conclude that a child is of low merit because he has a low I.Q., than to surmise that by merit of his low I.Q. he has less chance of becoming entrapped in the Promethean nether lands? After all, the primary and most celebrated function of intelligence testing is to predict success in our institutional settings. It isn't the child's fault that if we can't find the proper institutional setting for him we don't know what to do with him. It also isn't his fault that he may be of a different "class" of people who don't fit well into the carefully laid prophecies of our society. It isn't the poor or black child's fault that when his first grade teacher peers through spectacles at him he sees either a victim or a curse. That child certainly wasn't born knowing that Narcissus was a white man, but it doesn't take him long to find out. He soon finds it impossible to fall in love with an image that relegates him to an inferior strata with the rest of his "type." We can only blame ourselves if we haven't the knowledge or the courage to gauge the alternatives and choose the brighter path.

And once we are conscious of the available alternatives we have by our actions from that moment forward made a choice. If we elect to believe that man has played out his genetic potential and only by protecting a selective process can we protect our world from the ravages of the "inferior breeds," then we must accept the responsibility of the misfortune we cause those "inferior breeds." If, on the other hand, we choose to cast an image of man as a richly diverse species with unlimited genetic and environmental potential it is quite simple to choose your own equals from all classes and "races." It doesn't mean that all men are your equal in the talents we hold precious. What it means is that we can assimilate everyone into the evolutionary process and lay to rest atavistic myths. The individual will then have a chance to take advantage of a supportive educational system and the educational system will have a great wealth and diversity of talent upon which to operate. And we can all be brothers in the Epimethean era. We have the scientific rationale for either path, it is our individual intentions and aspirations that matter now. We can create Epimethean language to dispel archaic myths and depleted metaphors. We have only to do so.

If we are indeed at the threshold of yet another era of enthusiasm concerning man's genetic constitution, we are going to need inspiration to avoid the insensibilities of history. Let the following lines by T.S. Eliot be the final expression of this work and the abiding ideal for the future.

Last season's fruit is eaten
And the fullfed beast shall kick the empty pail.
For last year's words belong to last year's language
And next year's words await another voice.

T.S. Eliot
From "The Gidding"

APPENDIX

1900. The rediscovery of Mendel's contribution by deVries, Correns, and Tschermak was made after each, independently, had confirmed the principles by his own experimental observations. In the same year, Karl Landsteiner found that human blood could be classified according to agglutinating properties of red cells and serum, thus providing one of the best-known human hereditary characters.

1901. William Bateson in England published a translation of Mendel's paper, and also coined the terms allelomorph, homozygote, and heterozygote. The biometricians Galton, Pearson, and W.F.R. Weldon founded the journal Biometrika.

1902. Bateson defended Mendelism against attacks by Pearson and the biometricians who continued to assume wrongly that continuity of variation was an expression of "blending" heredity. Pearson attempted to prove that the observed parent-offspring correlations were quantitatively contradictory to the Mendelian expectation. (Four years later G. Udny Yule, a British biometrician, showed that Pearson's conclusions

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were based on the assumption of complete dominance, so that if gene action was incompletely dominant the Mendelian scheme would give such correlations.) Pearson's obstinancy lasted much longer, however, no doubt owing to personal quarrels with Bateson. Their dispute continued unabated at least until 1910 when the Mendelian nature of continuous heredity was demonstrated clearly.

1903. The pure line concept was proposed by Wilhelm Ludwig Johannsen in Denmark. Artificial selection for quantitative characters, he found, was effective in changing the mean of a population only as long as the population was genetically heterogeneous. Selection applied to most lines after three generations of selfing was ineffective, and variation observed within such stabilized "pure lines" must have been due to environmental factors. Phenotype and genotype were thereby defined: selection practiced on the phenotype is ineffective in changing the mean of a genetically homozygous line.

Bateson, deVries, Thomas Hunt Morgan, and their colleagues stressed mutation and qualitative gene differences as of prime importance to the evolutionary process. That group known as "mutationists" deemphasized the importance of Darwinian selection, and unfortunately Johannsen's report was immediately misinterpreted by them as showing how ineffective selection might be as a creative process. They pointed out that Johannsen's inbred lines represented genotypes

already in existence in the original unselected population that were "merely sorted out by selection." Darwinism was thus dealt a severe blow and did not recover until about 20 years later.

In the same year William Ernest Castle of the United States published experimental data on the inheritance of coat color in mice showing their Mendelian rather than Galtonian (blending) basis and illustrating the principles of "gametic purity." In sections of his paper he explored the outcome of selection against recessive genes and thus made the first correct statement of genetic changes under complete selection against recessives (in fact, he criticized through misunderstanding Yule's attempt to do the same calculation). He went further to consider what would happen if selection ceased and only random mating continued in subsequent generations. His conclusion for populations that "as soon as selection is arrested the race remains stable at the degree of purity then attained" is in essence the same as the familiar Hardy-Weinberg law.

1904. Pearson rejected Mendelism and at the same time correctly and inadvertently generalized the principle of segregation showing that the F2 ratio of $\frac{1}{4}$AA:$\frac{1}{2}$Aa:$\frac{1}{4}$aa will be maintained indefinitely in a randomly breeding large population. This statement was, like that of Castle's, a predecessor of the genetic equilibrium principle, but this one specifically applied only to a case of equal frequencies at one locus. Yule had actually shown the same rule two years before.

1905. George Harrison Shull (at the Carnegie Institution of Washington Experimental Laboratory, Cold Spring Harbor, Long Island, New York) and Edward Murray East with H.K. Hayes (at the Bussey Institution, Harvard University, Jamaica Plain, Massachusetts) began inbreeding experiments in maize, opening the field of quantitative theory and applied plant breeding, influenced by Johannsen's pure line concept and using biometric ideas of Galton and Pearson.

1906. At the Bussey Institution, Castle and his entomology student, C.W. Woodworth, discovered that drosophila was easy to culture. They brought this little "gift to genetics" to the attention of T.H. Morgan, but continued to study inbreeding, crossbreeding, and selection with drosophila in addition to their selection experiments with hooded rats. In the U.S. Department of Agriculture, George Rommel, chief of the Animal Husbandry Division, began inbreeding experiments with guinea pigs that were subsequently carried on in 1915 by Sewall Wright, another student of Castle.

1907. East demonstrated the resolution of a heterozygous population of maize into a series of pure lines as a result of artificial selection and inbreeding following Johannsen's concepts.

Ultimately, evolutionary theory was to benefit from another influence. In the same year, Vernon Kellogg published Darwinism Today, summarizing theories of evolution before

Mendelism caught hold. Kellogg called attention to the studies of J.T. Gulick (1832-1923) on land snails (Achatinellinae) in certain Pacific Islands. Gulick, an American missionary, had found what appeared to be random differentiation of races in similar environments of deep valleys on these islands. Sewall Wright read the Kellogg account in 1910 and later (1931) incorporated Gulick's ideas into his concept of random genetic drift, sometimes referred to as the Sewall Wright effect, but perhaps more properly (according to Wright) known as the Gulick effect.

1908. This was a crucial year for population genetics, although it was not recognized as such for at least another decade. The major contributions were two statements of genetic equilibrium published independently by Godfrey Harold Hardy, professor of mathematics at Cambridge University in England, and by Wilhelm Weinberg, a physician in Stuttgart, Germany. Hardy's paper, brief and concise, grew from a need for clarification when R.C. Punnett reported to Hardy that Yule had suggested as a criticism of Mendelism that a dominant gene should spread in a population at the expense of its recessive allele because dominants should tend to be distributed in a 3/4:1/4 ratio. Nothing was farther from the truth. Actually, Punnett did not get his information straight- Yule had not said it that way- but Hardy, though "reluctant to intrude in a discussion concerning matters of which [he had] no expert knowledge," and expecting the simple point he was

to make "to have been familiar to biologists," mentioned Pearson's stability of the 1:2:1 ratio and then contributed his own now-familiar statement for gene and zygote frequencies in a random mating population, generalized for a set of alleles at one locus. That paper was Hardy's sole contribution to genetics.

Weinberg, on the other hand, not only worked out the equilibrium principle for its utility in demonstrating a proof of Mendelian heredity in human families, but he also followed up his original contribution in later papers with extensions of the principle to independently assorting non-allelic loci, correlations between close relatives, and methods of partitioning variance between genic and environmental sources. Properly, then, we could say that Weinberg deserves the "father of population genetics" title if anybody does, because he developed for the first time and quite independently a theoretical set of principles applied to populations and derived from Mendelism. In a brief review of Hardy's paper in 1909, Weinberg commented that he himself had already proved the stability of population proportions "and in a simpler manner" than Hardy. Weinberg also laid the foundations for human genetics by realizing that simple Mendelian ratios are not often achieved in human families because of the "unavoidable fact of incomplete selection of such human families" in which normal parents are both heterozygotes. Only families with one recessive appearing can be ascertained completely, and he then invented methods of cor-

recting for types of incomplete ascertainment: the sib method, and the a priori method. According to Stern (1962) "Weinberg's fate bears comparison with that of Mendel... [He] had no colleagues who collaborated with him... no personal students... knew a few geneticists, among them F. Lenz (who treated the role of consanguinity in the appearance of recessive traits), but he remained outside the fold of most of his scientific contemporaries... His most significant discoveries, those on population genetics, were overlooked and had to be made by others [Fisher and Wright in the early 1920's]."

In 1908 Shull pointed out the decrease in size and vigor when luxurious F1 hybrids in his field of maize were inbred. Shull's belief that hybrids owed their vigor to their heterozygosity was a concept that led him later (1916) to coin the term heterosis. Along with Johannsen and East, he agreed that inbreeding would tend to separate lines into homozygous and weaker genotypes. The following year he suggested that first-generation hybrids between inbred lines could be used as a basis for practical corn breeding.

In Sweden, H. Nilsson-Ehle explained that seed color in wheat, a continuous "blending" character, could be determined by three Mendelian pairs of alleles with additive, nondominant effects ("multiple factors," later called "polygenes" by Kenneth Mather). This discovery helped to reconcile the blending hypothesis of Galton's biometricians with the Mendelian discrete unit of the mutationists, and it led to a basis for quantitative genetic principles and selection theory.

1909. In England, Archibald E. Garrod published Inborn Errors of Metabolism, a revision of the Croonian Lectures to the Royal Academy of Medicine delivered the year before. Also, the Galton Laboratory at the University of London was established from a bequest of Sir Francis to be the first laboratory for the study of human heredity.

1910. Thomas Hunt Morgan proposed sex linkage as a mechanism for white eye heredity in drosophila and was led into the concept of linear order of genes on chromosomes.

East summarized the reconciliation between biometric and Mendelian viewpoints, but much bitter antagonism in England prevented the emergence of population genetics there until after 1920.

1911. Sewall Wright heard Shull lecture at Cold Spring Harbor on inbreeding and crossbreeding in maize. "I recall that I was much impressed," said Wright, "though I cannot claim to have appreciated fully the enormous practical importance of his suggestions." This influence on Wright was to guide him in the next decade.

The human A-B-O blood groups of Landsteiner were demonstrated to be entirely hereditary by E. Von Dungern and L. Hirszfeld, although they proposed two independent pairs of alleles as the Mendelian basis for the two antigens A and B. In 1919 the Hirszfelds (Ludwik and Hanka), army physicians in the Balkans during World War I, determined blood groups

for many soldiers of diverse race and nationality. Their finding of differences in relative frequencies of blood groups among the races and nationalities represents one of the earliest human population genetics studies. It was not until 1925 that the correct mode of heredity for these blood groups was postulated by Felix Bernstein(a mathematician of Gottingen) when he applied the Hardy-Weinberg principles to the proportions of blood group phenotypes.

1912-1914. Raymond Pearl, a poultry breeder in the United States, working out theoretic consequences of brother-sister mating, devised a coefficient of inbreeding based on the decrease in number of common ancestors with receding generation, but he erroneously concluded that no change would occur in heterozygote frequency. Herbert S. Jennings and Harold D. Fish independently noted the error and published the correct interpretation showing that sib mating essentially leads to a decline in heterozygosity just as selfing does, although at a slower rate. Jennings took note of Hardy's and Pearson's conclusions on the stability of random mating populations, but his statements caught the attention of Sewall Wright who was to make a condiderable contribution to the study of inbreeding in the next decade.

1915. Morgan, Bridges, Muller, and Sturtevant published a very important book, The Mechanism of Mendelian Heredity.

Wright left an assistantship with Castle to take charge of a long-term experiment on inbreeding and crossbreeding in guinea pigs at the Animal Husbandry Division of the U.S. Department of Agriculture.

In Cambridge, England, Ronald Aylmer Fisher published in his paper on the distribution of the correlation coefficient. He was subsequently occupied with statistical problems suggested by the writings of Pearson and Yule. Punnett published Mimicry in Butterflies, which contained a table worked out by H.T.J. Norton giving the amount of selection intensity with generation time required to change gene frequencies in a Mendelian population. In 1926 Tshetverikov made use of that table in analyzing natural populations.

1916. Several contributions later became formative for significant aspects of the field: (1) J.P. Lotsy proposed hybridization ("introgression") as an important evolutionary mechanism, (2) Pearl demonstrated the effectiveness of pedigree selection contrasted with mass selection in poultry, (3) Shull suggested the word heterosis to describe the vigor of first-generation hybrids, and (4) Jennings developed a mathematical theory of inbreeding published in the first volume of a new journal, Genetics.

1917. E.C. MacDowell reported his selection experiments on drosophila bristle number, interpreting his results as did Johannsen years before and Sturtevant in the following year in terms of accumulation of modifiers by selection.

The Connecticut Agricultural Experiment Station produced the first commercial "crossed corn" by East and Donald F. Jones. The latter explained heterosis as due to linked dominant genes controlling increased vigor. In the following year Jones proposed the "double-cross" system for producing commercial maize, utilizing the benefit of F1 hybrids (A x B and C x D) to improve seed, the progeny of the F1 x F1.

Wright, at the U.S. Department of Agriculture, used the Hardy-Weinberg principle by comparing observed with expected values based on random mating in a case of color inheritance in cattle, and in the following year by rejecting a single gene hypothesis for the inheritance of human eye color.

1918. Fisher, who had left Cambridge University the previous year to become head of the statistical department of the Rothamsted Experimental Station at Harpenden, England, in his new role as statistical consultant, published his first population genetics paper, "The Correlation between Relatives on the Supposition of Mendelian Heredity" (Royal Society of Edinburgh Transactions). From that time to 1943 Fisher published at least 28 contributions to that field. This paper on the genetic effects of inbreeding and assortative mating helped resolve the differences between biometrical and Mendelian schools, largely because he used Pearson's data on human measurements to show that correlations fitted the theory of particulate instead of blending heredity. Reasoning of the biometricians was thereby reversed because they

had tried to derive all their "blending" arguments from close-relative correlations. Fisher's method was an independent derivation from that of Weinberg, whose work apparently was unknown to Fisher.

In the United States, H.D. King reported results of inbreeding rats for 25 generations and showed that close inbreeding is not necessarily deleterious because fertility and vigor were maintained in some lines. Francis B. Sumner made some instructive observations on the genetic differences within and between natural populations of the wild deermouse, Peromyscus maniculatus. J. Schmidt similarly reported racial studies in fishes (Zoarces spp.), as did Richard B. Goldschmidt for the gypsy moth (Lymantria dispar). These men had great influence in establishing the genetic basis for geographic diversity within species.

The earlier decades of Mendelism thus ended, with the stage set for major advances, the first in terms of mathematical statements derived from breeding observations coupled with Darwinian evolutionary theory and deVries's mutation theory. Confirmation of those generalizations with empirical determination of real populations, natural and experimental, followed in greater degree about a decade later. We should keep in mind that progress in developing the major concepts in this discipline came as a product of interaction between theoreticians and experimentalists. The fullest realization of progress came about after that fact became more obvious to geneticists, ecologists, and evolutionists, at least by the end of the 1950's.

1921. The "Systems of Mating" series of papers by Wright generalized theories of inbreeding and crossbreeding. He invented the method of path coeffecients, which serve to analyze, by subdividing correlations in a causal scheme, the relative contributions of interacting factors on the determination of a measured effect. Correlations between relatives under various mating systems were worked out in a general scheme with path coefficients connecting zygotes and gametes. Wright then proceeded to examine the outcome of random sampling of gametes in populations of limited size, a study that led him to generalize the scattering of genetic variability in the concept of "random genetic drift."

Fisher derived expressions for the outcome of selection favoring heterozygotes, or balanced genetic systems. Later those expressions were to be incorporated in the concept of balanced polymorphism defined and described extensively by E.B. Ford in the 1940's.

1924. John Burdon Sanderson Haldane, a reader in biochemistry at Cambridge University, worked out the mathematical theory of selection by considering a single gene subject to natural selection and mutation: frequencies of autosomal dominants, recessives, sex-linked and partially sex-linked genes, including the equilibrium state when new alleles produced by mutation are balanced by elimination through selection in a steady-state population. This work led him to estimate mutation rates for human deleterious genes. Haldane ascribed most of the ideas on this subject to H.T.J. Norton.

1926. In Moscow, Sergei Sergeevich Tshetverikov published "On Certain Aspects of the Evolutionary Process from the Standpoint of Modern Genetics." That paper formulated clearly, although without the elegance of mathematical refinements, the basic tenets of what later came to be known as the biological, or synthetic, theory of evolution- namely, that mutational variability is the source of raw materials for evolution, but does not constitute evolution itself. Populations in nature, he concluded, absorb mutations "like a sponge" and retain them in heterozygous condition, thereby providing a store of potential variability out of which the population may utilize a portion for its adaptedness (an idea we now include in the concept called by Muller "the genetic load" of a population). Among the geneticists who were stimulated by Tshetverikov was Theodosius Dobzhansky, who received his first drosophila stocks from Tshetverikov. Other people influenced by Tshetverikov were H.J. Muller, who visited the Soviet Union in 1933-1937, N.W. Timofeef-Ressovsky, N.P. Dubinin, and S.M. Gershenson, all of whom were inspired to analyze natural populations for frequencies of mutant alleles and to discuss the mechanisms of natural selection on the genetic potential of populations, or what has been termed "microevolution." Of these geneticists, one of the most outstanding for his major contributions to experimental population genetics has been Dobzhansky, who arrived in the United States in 1927, worked with T.H. Morgan a few years, and was soon appointed to a staff position at California Institute of Technology.

1929. Fisher published The Genetical Theory of Natural Selection. His central theme was the determination of the rate of increase (= Malthusian parameter), or "mean selective value" (in Wright's terminology), or Darwinian "fitness" value of genotypes and the bearing of genetic unfixed elements in the population on that parameter. These considerations culminated in his "fundamental theorem of natural selection"- "the rate of increase of fitness of any organism at any time equal to its genetic variance in fitness at the time" (in which genetic variance refers to the "additive component," or linear component of genetic variance). In addition, he summarized much evidence on the evolution of dominance, developing his theory of accumulation of dominance modifiers (later criticized by Wright). Fisher included important discussions on sexual selection, correcting and improving much of the Darwinian argument, on mimicry, and on eugenics.

Fisher's book, while difficult for biologists in its mathematical and occasionally enigmatic language, did set forth sharply the Mendelian structure of variation in natural populations. His emphasis on the relationships of genetics to natural selection had a tremendously powerful effect on thought in many fields of biology; this book is often taken as a landmark of renewed interest in the study of evolutionary genetics, or the synthesis of modern evolutionary doctrine.

1931. In the United States, Sewall Wright published an equally important contribution: a long paper in Genetics, "Evolution in Mendelian Populations." His central problem was an attempt to synthesize a balanced theory of evolution by consideration of the known forces acting on gene frequencies in populations, at least for simple genetic systems. He set out in orderly fashion those parameters expressing the "directed pressures": recurrent mutation, selection, and migration (or hybridization between populations), plus the "non-directed" random fluctuations due to sample size (or effective population size). He concluded that the state of a population's genotype complex represents a balance among these determinate and indeterminate forces. In the course of his exposition he used an analogy of contour diagrams with peaks and valleys to represent a "surface of selective values" ("W") for genotypes within populations. This graphic presentation of the numerous combinational possibilities of forces allowed Wright an efficient device to symbolize his explorations of forces on genotypes among partially isolated and differentiated local populations ("demes"). Two factors stressed and developed by Wright were (1) random drift of gene frequencies and the fluctuations in the "pressures" brought about by small population size and (2) the significance of interpopulational selection (interdeme), especially when a species is subdivided into partially isolated local populations in which local pressures and random fluctuations provide raw material for intergroup selection- the conditions

for most rapid evolution. He assigned a considerable role to random drift as a factor to be accounted for in the network of balanced forces, which produced violent criticism from Fisher and his colleagues who accused Wright of substituting drift for natural selection. This misunderstanding lasted through the following two decades and tended to delay in Great Britain any major role for indeterminate (stochastic) factors in the genetics of populations.

1932. Haldane contributed a synthesis of evolutionary doctrine and genetics in The Causes of Evolution. He reviewed his 1924 theory of selection and the concepts of selection intensity (and what he later termed "cost" to the population for substituting new mutant adaptive alleles), differentiated between elimination rate by selection and the relative selective value of a genotype, and finally made cogent summaries and remarks about the recent contributions of Wright and Fisher on the subjects of random drift and isolation.

From that time on, all the ingredients for fruition of an exciting enterprise were established. It may seem to many readers that the beginnings of population genetics contrast markedly with those of other branches of genetics, notably microbial and molecular genetics, in that its early years are famous for major theoretical statements by three giant intellects (Fisher, Haldane, and Wright) rather than for experimental observations. However, it should be apparent after this brief summary of cogent events that in fact the

observations made by Mendel, Darwin, and the early geneticists constituted the stimulus for those theoreticians and their generalizations. It was not enough for complete theory to rely only on observations of genetics; with greater sophistication in understanding genetic architecture, the demonstration of selective differences between genotypes in real populations, the magnitude of selection, and the subtlety of the dynamic elements controlling the genetic potential of populations in the following decades extended and modified these important early generalizations so that in the present day we have far deeper concepts of genetic dynamics in populations.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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